

SENATOR

& KAMINER

HEALTH AND DISEASE

IN RELATION TO MARRIAGE

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HEALTH AND DISEASE

IN RELATION TO

MARRIAGE AND THE MARRIED STATE

A Manual Contributed to by

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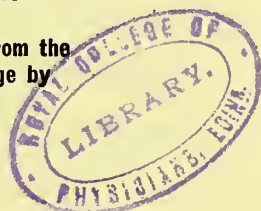
Dr. med. **S. KAMINER**

The Only Authorized Translation from the
German into the English Language by

J. DULBERG, M.D.

of Manchester, England

VOLUME I.



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Translator's Preface.

The *raison d'être* of this book is fully explained in Professor Senator's Introduction, so that it is needless for me to further emphasize it.


I have endeavoured to render a faithful version of the German text in the English language. Those particularly who are acquainted with the intricacies of the German tongue, especially when employed in writings on scientific subjects, will appreciate the onerous task I have undertaken and will readily overlook any shortcomings of which I may have been guilty.

Although much contained in the German original does not seem to immediately bear upon our interests here, I have thought it the better course not to omit any portion, and I leave it to the judgment of the reader to eliminate what he considers superfluous.

A small number of printer's errors have crept into the text, and for these I crave the indulgence of the reader. Attention is drawn to them on a separate page.

JOSEPH DULBERG, M.D.

Manchester, July 6, 1904.



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I

Introduction

Errata.

(NOTE: f. i. stands for: for instance.)

Page	54	line	26	<i>for</i> to regard <i>read</i> in regard to
"	233	"	14	<i>for</i> optical <i>read</i> optional
"	246	"	6	<i>for</i> tention <i>read</i> tension
"	248	"	4	<i>for</i> sensible <i>read</i> sensitive
"	251	"	16	<i>for</i> pregnancy <i>read</i> menstruation
"	274	"	20	<i>for</i> constituted <i>read</i> constitutes
"	297	"	1	<i>for</i> disappears <i>read</i> disappear
"	303	"	26	<i>for</i> froms <i>read</i> forms
"	303	"	28	<i>for</i> region <i>read</i> lesion
"	423	"	11	<i>for</i> light <i>read</i> high
"	424	"	13	<i>for</i> so as to <i>read</i> so to
"	425	"	14	<i>for</i> 18 days after <i>read</i> 18 cases after
"	431	"	13	<i>for</i> appear a typical <i>read</i> appear typical
"	374	"	14	<i>for</i> probable <i>read</i> improbable
"	391	"	16	<i>for</i> physical <i>read</i> psychological
"	445	"	10	<i>for</i> % <i>read</i> $\frac{00}{00}$
"	454	"	26	<i>for</i> which <i>read</i> who
"	476	"	30	<i>for</i> appearances <i>read</i> appearance

Health and Disease *in relation to* *Marriage and the Married State*

I

INTRODUCTION

By **Professor H. Senator** (Berlin)

MARRIAGE has probably at all times and with all nations—excepting perhaps a few races in the lowest stages of evolution—been regarded as an institution of the highest importance to the existence and prosperity of human society. The marriage ceremony has consequently always been celebrated more or less solemnly as the commencement of a new and momentous period and distinguished by festivities whose nature depended upon the actual state of civilisation as an exceedingly great event.

From very early times religions and legislatures have endeavoured by laws to regulate the new conditions arising from the married state with a view to increasing the welfare of whole nations or of the entire human family. Decisive factors in the framing of those laws were besides the demands of morality, the judicial aspects of marriage, the legal relationship between husband and wife, that between them and their relatives and descendants as well as the entire community. The laws as to marriage and succession have been drawn up by all civilised States with the utmost care and regard to minutest details.

On the other hand the question of the somatic condition in reference to marriage and the marriage contract has hitherto been little thought of. What effect the physical state of husband and wife has upon each other or their union; *vice-versâ* what influence marriage has upon the life and health of the married couple and their descendants or even on the welfare of whole families and communities—these questions have as yet received outside medical circles and particularly at the hands of legisla-

tures either no recognition at all or not as much as is demanded by our present knowledge and views.

Even the Mosaic law which contains the minutest hygienic prescriptions with regard to every phase of life confines itself on this subject to regulations concerning sexual intercourse (particularly, it appears, with a view to preventing infection) and to that connexion which is designated as "Incest." In the law books of other nations and chiefly those of the civilised West health and disease with regard to marriage and the married state are only taken into consideration in so far as they affect the **object** of marriage. As such was exclusively looked upon in olden times and frequently also by modern legislators¹ the procreation of children for the propagation and preservation of the human race or more correctly, as the ancients put it, for the continuity and advancement of the State.

As a result of this point of view the absence of the procreative age and any physical infirmity impairing the procreative faculty were considered valid impediments to marriage; otherwise no importance was attached to the physical condition of the parties contracting or living in marriage, unless such a course was called for by the dictates of morality.

The intention to create for the State strong and hardy citizens, and only such, found its most markedly practical expression in the customs of the Spartans who went so far as to suspend compulsory monogamy or monandry in the case of unfruitful marriages and to encourage the destruction by exposure of delicate and sickly infants.² It was the same notion that evidently influenced *Plato*³ when, in legislating for his ideal State, he suggested rules and regulations as to the contraction and form of marriage, which intended chiefly for full citizens and public servants had no other object in view but the procreation of strong and active children. *Aristotle*⁴ went even to the extreme of almost demanding the municipalisation of marriage and of the procreation of future generations. Those Spartan customs have never achieved general popularity, and

¹For instance, the Prussian common-law (Landrecht).

²*Xenophon*, de republ. lacedæm. I. 3 sq.

³*Plato*, de republ. V., chap. 8. 9.—*Timæus*, p. 19a. 4.

⁴*Polit. H.* 3. 7. IV. B., 14, etc.

they are indeed diametrically opposed to our present-day feelings and our conception of humanity and ethics. The views of *Plato* and *Aristotle* on marriage and procreation have never been put to a practical test, not in ancient times and still less at subsequent periods, partly because they would permit to the State authorities too extraordinary an interference with the personal liberty of the subject and partly because the moral essence of matrimony has in the course of time and particularly under the influence of Christianity come into greater prominence. With the growing authority of the Church the solicitude for the spiritual welfare of the people assumed an ever increasing importance and all other considerations especially those relating to bodily well-being, earthly possessions and physical strength became of secondary consequence. Gradually, however, a change took place and the physical side of life enjoys at the present time greater appreciation or even as it is often reproached with, over-estimation. Whether this reproach is justified or not the endeavours of our generation to raise the prosperity of the nations by politico-economic measures which have many points in common with various sociological ideas prevalent in olden times deserve full recognition.

These endeavours and measures are rightly concerned in the first instance with the care of the health and vigour of the community which are necessary conditions of spiritual and moral progress. *Mens sana in corpore sano*. From this standpoint of public health and the preservation of the national energy marriage deserves the fullest consideration much more than it has generally received hitherto, because its importance to the physical and mental welfare of humanity goes further than the desire for a healthy and vigorous offspring. Apart from the sphere of procreation it has numerous relations to health and disease, namely in three directions. Marriage can be on the one hand a source of disease or the aggravating cause of pre-existent diseases; *vice-versâ*, diseases or physical defects can have a disturbing and detrimental influence upon marriage, and it is finally possible for marriage to consummate the cure or alleviation of conditions of ill-health.

With regard to marriage as a cause of disease the very

entrance into new conditions of life necessitated by the act of marriage, the separation from accustomed surroundings, the transition to an intimate companionship with a person of the opposite sex can give rise to depressions and disturbances of various sorts. These may be caused independently of sexual intercourse by the necessity of husband and wife to fuse their identities and by the mutual dependence upon each other thus created—in brief, by the whole force of the new mode of life.

The influence of marriage in this connection is naturally stronger and more frequently evident in the wife than the husband, partly because of the greater sensitiveness of the nervous system in the female and partly because the changes occasioned by marriage in the life of the woman are of much vaster significance than is the case with the man, though even in him marriage, inasmuch as it is the foundation of a household and a family, may also be productive of diseases as an outcome of the anxiety and worry of responsibility.

Secondly it is by the transmission of disease from one person to another that marriage can become a fruitful source of illnesses not only of a venereal character but also of other kinds as *f. i.*, tuberculosis and other infectious or parasitic diseases; for it is obvious that married life presents the most favourable opportunity to all the causative agents of an infective nature.

Thirdly, sexual intercourse *per se*—that is where both husband and wife are in perfect health and there is no vestige of any transmissible disease—can produce in various ways conditions of ill-health either of a purely mechanical nature (as *f. i.* injuries, hæmorrhages and inflammations caused by the sexual act) or through the influence which this act exercises upon the nervous system and which again is keener in the woman than in the man, or finally through pregnancy and childbirth which, although physiological processes, are nevertheless often enough the starting point of various and numerous untoward conditions.

Fourthly and finally, marriage is for various reasons of the highest importance as to the life and health of the offspring. To begin with, the labour process alone may cause injury to the child or occasion its death. But of no less import are certain conditions in the state of the parents or of one of them prior to

the birth of the child which play an important part at the conception and during pregnancy and may have a calamitous effect upon the embryo. Indeed such conditions are becoming too frequent.

It is erroneously assumed particularly in lay circles that it is only for such diseases of their parents as are acquired through debauchery and excesses that the children have to pay the penalty. This is not so. At least just as many absolutely innocent parents free from all taint of immorality and with a pure past life bring into the world dead or delicate children, children predisposed to all kinds of diseases, not as a consequence of their sins and vices but through circumstances connected with the married state which have either knowingly or unknowingly been neglected or disregarded.

As sound and wholesome fruit can only grow on sound soil so a healthy vigorous progeny requires health and vigour in the parents and ancestors. This radical truth has from the earliest times been duly appreciated by agriculturists and practically acted upon with regard to plants and animals. It is true that *Plato*¹ has recommended a similar natural selection with regard to human procreation but his precepts, though they have received some confirmation by the Darwinian theory, have in reality remained "platonic" for the reasons already mentioned. How often are these principles violated both in the contraction of marriages and in their consummation! What a number of weak and deteriorated generations have been the outcome of these transgressions! With more justification than Mephistopheles to the student can we exclaim to every child descended from diseased ancestors, to every descendant of wretched family conditions: "Woe to thee that thou a grandson art!"

And *vice-versâ*, as regards the influence of physical defects or of disease on the course of marriage this has for easily comprehensible reasons never been misunderstood or undervalued since it at once affects the question of procreative activity or even only that of the natural gratification of the sexual instinct. As has already been mentioned, both in ancient times as well

¹De republ. VIII. 459.

as at subsequent periods regulations have been decreed by the State or the Church with a view to preventing marriages incompatible with those objects or to dissolving them when they had already been contracted. These regulations of the different legislatures though unequal in their extent were unanimous in taking into consideration only a very small number of the physical conditions which can have a disturbing or damaging effect upon the married state. The reason is that the essence of marriage does not consist exclusively of the above-named objects relating merely to sexual life, and because all those disturbances which do not refer to the latter have either been entirely disregarded or very little thought of. It also became necessary with the gradually rising conception of the essence of marriage to attach proportionately less importance to bodily defects and infirmities. Moreover the view which the Church took of marriage as a divine institution or a sacrament was necessarily followed by as limited a restriction as possible of the impediments to marriage. The consideration which also has to be paid to personal liberty, to the right of the individual to choose for himself, a right which on such occasions as the contraction and consummation of marriage is of greater importance than in any other human institution, seems to make it very desirable that the marriage laws should contain as few ordinances as possible.

It is not the province of the medical man to lay down any rules because from the purely medical point of view it is only necessary to establish the fact that just as it may occasion danger to health, so marriage may on the other hand itself be subject to danger either through disease or through imperfect physical development, and that this danger is present not only under circumstances connected in any way with sexual life but also in other deviations from health and normality.

It is absolutely clear that it is principally, if not exclusively, chronic and hardly ever acute conditions which can act injuriously upon marriage. There will be opportunities to enter more minutely into this part of the subject when discussing the several diseases in their relation to married life. But these same relations present finally also a more agreeable side inasmuch as marriage can and often does exercise also a beneficial, salutary

influence upon the life and health of husband or wife. This influence can make itself felt prophylactically as well as therapeutically. Prophylactically in so far as married life with its attendant regular habits presents fewer opportunities for debauchery or other insalutary transgressions and more favourable hygienic conditions than single life, particularly so in the case of bachelors; and therapeutically inasmuch as there are conditions of ill-health which undoubtedly benefit or are even cured by the matrimonial state. They are mostly conditions of the nervous system, of the sexual life, and certain anomalies of the pelvic organs and of the blood more or less intimately connected with the procreative faculty. This therapeutical effect of marriage is also of deeper importance to the female sex than to the male and though it may not play as weighty a part as the ætiological factor of marriage does in the causation of disease it is not by any means deserving of undervaluation.

The foregoing remarks should make it sufficiently clear that matrimony with all its consequential conditions presents an enormous field to the activity of Public Hygiene and of Preventive Medicine. We have only to think of the number of marriages which are constantly being entered into without any regard to the physical condition of the parties contracting them, without any attention being paid to their constitution, state of health, descent or possible hereditary predisposition to disease. Let us realise how often necessary sanitary precautions are through ignorance or carelessness, or for the sake of other considerations, neglected by people about to marry or already married, and we shall at once understand how it is that marriage is responsible for so much disease and misery, so much wretchedness and misfortune in this world, and also how much of it could be avoided by judicious sanitary measures. Truly an object worth striving for!

In order to attain it, it is above all necessary that the medical profession should become familiar with all the conditions bearing on the subject and that it should be consulted before the consummation of intended marriages as well as during married life. There is no more appropriate person for this than the

ordinary family practitioner who knows the histories of the patients entrusted to his care and therefore has unequalled opportunities of observing them from their childhood or even from their birth. It is to be regretted that the tendency among the public to consult a specialist in every case of illness is having the effect of gradually eliminating the old-fashioned family attendant, a class of practitioners who should rather receive all possible encouragement with a view to becoming much more general. To decide whether a specialist is required or not, ought to be the concern of the family doctor who, no matter how capable he is, cannot be expected to be—nor is it necessary that he should—an expert in every branch of medicine, but is certainly more qualified than a layman to judge whether the opinion of any particular authority is called for.

In like manner this applies to the problems with regard to marriage and the contraction of marriage which we should like to see assigned to the medical man. For the questions relating to this matter belong to the various domains of medicine; they are consequently found more or less scattered among the subjects dealt with by its several subdivisions, though not always exactly from those points of view which interest us here. Some of these questions indeed have only arisen within recent times and been made the object of special research; others again though not exactly new yet have only lately been elaborated more carefully than was possible in former times. May it suffice to merely mention here the theory of parasitic diseases and their transmission, the doctrine of heredity and hereditary predisposition.

There appears consequently to be every justification for the attempt made as far as I know for the first time by the present Manual to collect all these questions into a comprehensible *ensemble* that shall serve to the medical man as a source of information, as a guide to his conduct in circumstances affecting the weal and woe of so many human beings. For may not the dictum of the physician have a decisive influence upon the future of whole generations?

Of course it will often be extremely difficult, sometimes perhaps impossible, to arrive at a decision, for even medical skill

and knowledge cannot accomplish the superhuman; but this book will ever act as a help and counsellor to the practitioner by informing him to what extent medical interference is possible. In doubtful cases it is better to declare oneself incompetent rather than shoulder unlimited responsibility by a decisive opinion.

It is not unreasonable to hope that when the knowledge of the relations between marriage on the one hand and health and disease on the other will have become more general in medical circles the profession will by its exertions, by instruction, explanations and warnings succeed in convincing the larger public as to the utility, aye, necessity of taking into consideration the physical condition of the parties contracting or living in marriage. Is a medical opinion less called for on such occasions than it is for instance with respect to the fitness of school-children, the inspection of scholastic establishments or the acceptance of candidates for life insurance?

It can hardly be expected or demanded that this conviction shall result in submission to medical authority in absolutely every case. There may arise occasions when considerations of health or even life would have to yield to others far more weighty and when medical opinion would be obliged to give way to circumstances of superior force.

It were also desirable that the State or Municipalities should devote greater attention than has hitherto been the case to the somatic conditions of persons about to marry or already married without giving rise to any fears that compulsory measures will become an immediate necessity. But inasmuch as marriage is an institution of the deepest importance to the welfare and economical prosperity of a nation the query is by no means unjustified whether it ought not to be permissible in the interests of the commonwealth to introduce measures calculated to restrict marriage where the sanitary conditions are unsatisfactory or to protect from danger persons already married much in the same way as is done by the laws and regulations with regard to vaccination, disinfection, etc. The question may therefore well be asked whether having regard to the health of the people living in matrimony and to that of their descendants

there should not be an expansion of the legal impediments to marriage and of the divorce laws as also of the punishable offences committed by husband or wife against each other or their offspring. At the same time it must be admitted that the difficulties which will have to be overcome in order to find a course consonant with the interests of the community as well as the demands of justice, with the general notions as to morality as well as the personal liberty of the subject are exceedingly great.¹

To enter into a minute discussion of these questions is not within the domain of medicine, and we must rest contented with having drawn the attention to the subject of all those whom it concerns, and with being the instigators of an agitation that ways and means shall be found to produce an amelioration of the conditions above mentioned.

It is idle to entertain the hope that the State and society will ever succeed by regulations, no matter how carefully planned and even if they were so exacting as those demanded by *Plato* for his best State, to create exclusively ideal marriages, but it is not unreasonable to hope that increased vigilance with regard to the sanitary conditions of marriage will result in the avoidance of a mass of disease and misery and in rendering so many marriages happy that there shall be every justification for *Goethe's* poetical description of the matrimonial state (*Die Natuerliche Tochter*, Act 4, Scene 2).

„Vollbestand

Erwünschter Lebensgüter sind wir ihm,
Sowie der Zukunft höchste Bilder schuldig.
Als allgemeines Menschengut verordnet's
Der Himmel selbst, und liess dem Glück, der Kühnheit
Und stiller Neigung Raum, sich's zu erwerben.“

¹That these difficulties are not insurmountable in every respect is evidenced by the proposals recently made by such eminent jurists as Prof. v. *Liszt* and Prof. *Hellwig* (*Zeitschrift zur Bekaempfung von Geschlechtskrankheiten*, 1, 1903), with a view to preventing the spread of disease by sufferers from venereal affections. It might be worth considering whether it is not possible to propose and introduce similar measures of protection from the dangers arising from other diseases f. i. drunkenness.

II

The Hygienic Significance of Marriage

II

The Hygienic Significance of Marriage

By Professor M. Gruber (Munich)

I. Necessity of regulating sexual intercourse.

—Sexual instinct makes of the individual an instrument of procreation. In associating the performance of the procreative act with the highest pleasurable sensations nature has taken care that the individual shall not shirk his duty, that the stream of life shall not dry up. But while the desire is so strong and its gratification so agreeable it presents many dangers both to the individuals fulfilling it as well as to their descendants. Of course nature removes the damage thus caused by destroying in the course of time the feeble, the degenerate and the diseased. But this readjustment takes place at the cost of an enormous amount of pain and misery, of a wholesale destruction of individuals, families, races and nations. If the extent of this misfortune is to be diminished, if these dangers are to be avoided it is necessary that the blind desire shall be restrained by reason, and it is certain that mankind has from its earliest beginnings recognized more or less clearly the necessity of regulating sexual intercourse and attempted more or less aptly to deal with it. The more our knowledge of natural processes advances the more we become convinced of the necessity of this regulation, and the stronger the influence of this conviction on our will-power the more it is permissible to hope that near generations will treat the subject with incomparably greater wisdom than we are capable of.

But not all the fruit of the tree of knowledge is nutritious

and wholesome. Reason and civilisation can show the way also to the unnatural, and consequently to new dangers and injuries of moral and material kinds. The temptation is particularly great to deprive nature of her reward and to try whether and how it is possible to enjoy the delights of love without taking upon oneself the burdens of procreation. The more cynical an individual is in the satisfaction of his own selfish ends and in seeking pleasures without regard to others the more frequently and the more completely he will succumb to that temptation.

But nature will hardly allow anyone to impose on her with impunity, and most of these attempts result in the end in bodily harm to their originators. Even though the individual escape unpunished it is the community, the nation, which suffers where the evil assumes large proportions; not only because the natural increase of the population remains at a standstill but much more on account of the diminished family sentiment—that source of humanity which is hardly capable of substitution.

There is certainly no exaggeration in regarding a well-regulated and yet natural sexual life of a nation as the indispensable foundation of its permanent spiritual and physical health. A nation which seeks in sexual life nothing but pleasure is bound to disappear. The future belongs to the race that regulates its sexual life with a view to procreating a strong and mentally efficient progeny.

It has been prophesied that the medical profession will become the leading element of the nations. If this prophecy is to prove true it becomes primarily necessary that medical men should fully realise the enormous importance of a regulated sexual life in the procreation and formation of healthy and capable descendants, so that they may as the hygienic advisers of individuals and families unceasingly spread and keep alive this conception with all its consequences. Only *he* is fit to be the leader of a nation who feels from the bottom of his heart that man can only prosper in his capacity as *part of society*, that is as a moral being!

II. Hygienic advantages of marriage. a. Prolongation of the life of married individuals.—There can be no doubt that monogamous permanent marriage

which appears to be a most natural consequence of the numerical proportion of the sexes is morally as well as hygienically the best system for the gratification of the sexual desire.

Marriage is in the first instance like all our modern social and civilised institutions an arrangement which is of the highest benefit to the health of the married persons themselves. This statement applies fully, as statistics of mortality point out, with regard to all men over twenty years of age; with regard to women not before the fortieth year, since many of them are during the child-bearing period liable to succumb to the dangers that accompany the sexual life of the female, many of which however, it is scarcely necessary to mention here, can be avoided by rational midwifery and an appropriate care of the puerperal woman.

Since as the statistics of all European countries show the same results, only those of Sweden are here given as an example.

TABLE I.¹

Sweden, 1881-90—Of 1,000 persons of each age-class, there died annually:

Age Years	Males				Females			
	Single	Married	Widow- ers and Di- vorced	Total	Single	Married	Widow- ers and Di- vorced	Total
20	6.10	4.64	—	6.09	4.85	6.40	9.95	4.96
25	7.59	4.28	10.15	6.74	5.66	6.16	9.41	5.85
30	9.20	4.95	8.90	6.73	6.42	6.37	10.23	6.44
35	11.24	5.68	10.76	7.11	7.02	6.96	10.16	7.06
40	14.67	7.42	12.89	8.75	8.13	7.94	9.50	8.06
45	19.07	9.22	13.75	10.62	10.15	8.04	9.99	8.60
50	22.75	11.68	17.35	13.15	12.18	8.99	11.88	9.90
55	28.68	15.40	21.62	17.09	17.07	12.31	15.53	13.64
60	37.16	22.11	29.96	24.33	23.22	17.24	21.18	19.13
65	49.42	31.45	40.23	34.44	34.74	27.00	31.33	29.59
70	70.40	47.95	58.65	52.55	49.93	42.76	48.82	46.52
80	138.90	121.42	142.97	134.10	127.66	105.31	119.34	117.73
90	234.58	274.78	318.97	306.47	293.11	235.04	268.45	268.00

It is very important that we should have a clear idea wherein

¹S. *Westergaard*, Die Lehre von der Mortalität und Morbilität, 2nd Edit. Jena, 1901. Fischer, p. 228.

the favourable influence of marriage lies. An attempt has been made to prove by these statistics that sexual intercourse is a healthful necessity. But not only does this view rest on a foundation far too ingenuous for modern conditions, namely, that all single men are as a matter of course continent; it is inadmissible because there is more than one factor contributing to produce a lower mortality among married persons than among those living singly. The fact that monks and nuns do not generally show a materially higher mortality than is the average of their respective ages (*Déparcieux*) does not seem to indicate that the frequent sexual intercourse of married life is beneficial to health in a marked degree.

Among the lower classes the opinion prevails and for easily comprehensible reasons is assiduously imparted by the husbands to their wives that sexual intercourse or the frequent discharge of semen is of absolute necessity to the health of the man. Science however cannot subscribe to this. It is absurd to regard the seminal fluid as an injurious secretion which requires regular evacuation like f. i. the urine. There is probably no doubt that part of the semen is not only reabsorbed during sexual abstinence (perhaps in the vesiculæ seminales, *J. Exner*¹); but that this reabsorption seems to have even a beneficial effect on the constitution if we may judge by the experiences of athletes, sportsmen, scholars and artists who feel most fit for work when refraining entirely from sexual intercourse. It has been proved by *Zoth* and *Pregel*² with certainty that the testicular extract of Brown-Sequard has a decidedly beneficial effect on nutrition and bodily strength and that it favours particularly the activity of the nervous and muscular systems. This is evidenced by increased muscular action, a diminished sense of fatigue and enhanced recuperativeness. The development of secondary sexual characters, physical and psychical, are doubtless also due to the reabsorption of the secretion from the seminal glands. Whether it is the direct constituents of the seminal fluid that come into question or, which is more probable judging from the

¹Handbuch der Urologie, ed. by *v. Frisch* and *Zuckerkancl*. Vienna, 1903.

²*Pflüger's Archiv*. Vol. 62, p. 235 and Vol. 69, p. 386.

analogy between the male and the female, another "internal" secretion, is here quite immaterial. In any case, this reabsorption acts favourably, as is also shown by comparing normal men and women with castrated individuals.

Nevertheless it is conceivable that the tonic and irritating influence of the seminal fluid may under circumstances become too strong and that its continued reabsorption may cause a kind of "loading" of the nervous system which requires periodical "unloading" by means of the sexual act.

It is also possible that the reabsorption does not keep pace with the secretion so that injurious congestions of the latter take place in the seminal glands and their ducts which need removing.

To these conjectures it is possible to reply that the testicles behave like all other organs; namely that their blood supply and consequently their activity is increased by use and diminished by non-use. (See the researches of *Lode*¹ on the quantity of spermatozoa in the semen.) Moreover accumulations of seminal fluid are hardly possible as the secretion is generally discharged by means of nocturnal emissions which so long as they do not occur too frequently must be regarded as a physiological process.

There appears to be no doubt that the majority of normal men can no less than women permanently renounce sexual intercourse or the gratification of the sexual desire altogether without suffering any injury. Those who do not believe in the experiences of man may judge from what we see in our domestic animals. Stallions and mares, male and female dogs remain healthy though they are not allowed to copulate.

It is of course presumed that every intentional and artificial excitement of the sexual instinct is avoided, otherwise it is possible for the desire to assume the character of a forcible impulse.

All possible ill-effects have been attributed to continence. In man, nervous irritability, insomnia, headache, a feeling of tension and oppression in the pelvic region, pain in the testicles

¹*Pflüger's Archiv*. Vol. 50, 1891, p. 278.

and in the spermatic cord, varicocele, morbidly frequent and exhausting emissions, spermatorrhœa (accompanying defæcation), impotence, satyriasis, etc. But most of these manifestations are not due to continence. They are more likely the consequence of sexual over-indulgence, especially reckless masturbation, or as is the case with satyriasis of demonstrable disease of the genital organs themselves or of the central nervous system. As regards the minor ailments which may perhaps to a certain extent really be associated with continence they are easily combated by a hygienically proper mode of life (cold sponging, cold baths, physical exercise, abstinence from alcohol and other irritating substances, a cool and not too soft bed, etc.).

Leucorrhœa and nymphomania in females are likewise hardly ever the product of continence but exceedingly often that of sexual intemperance or unrestrained masturbation. That some diseases which are also attributed to continence as f. i. tumours of the uterus and hysteria have nothing to do with it is sufficiently proved by the fact that they are more often present in married women and mothers than in virgins. The opinion that genuine chlorosis can be cured by marriage and pregnancy has long since been found to be erroneous.

It is true that suicide is more frequent among single than among married persons; but the rarity of love as the inciting cause of suicide (3-6%) tends to show that the ungratified sexual desire plays no important factor in such cases. Moreover, it is very questionable whether all unmarried suicides are chaste.

I have gone so minutely into the question of the injuriousness of continence because many individuals are either permanently or at any rate for a time obliged to forego the idea of marriage; because during married life also long periods occur in which sexual intercourse is impossible or not permissible and because there are unfortunately medical men yet to be found who carelessly recommend non-connubial intercourse to patients, who find themselves in such circumstances, as a means of combating the alleged harmfulness of continence. These practitioners forget the enormous risks of venereal disease to

which they advise their patients to expose themselves—not to speak of the objectionable and immoral character of such council.

It is consequently not the frequent gratification of the sexual desire which constitutes the cause of the remarkable comparative longevity of married men. It may rather be taken for granted that their more orderly and regulated mode of life, the, on an average, lesser abuse of alcohol and the relative infrequency of venereal infection and of its consequences are the factors which play the principal part.

There is of course one other item which deserves mention as apparently contributing to the beneficial influence of marriage. Marriage involves even in our present day a certain selection of the fittest, though not a sufficient one, inasmuch as highly degenerate individuals such as idiots, lunatics, cripples, lame or blind persons, etc., are as a rule excluded from it. The quality of the married class is therefore, to begin with, somewhat better than that of the single class. As a matter of fact it has been attempted to attribute the whole of the difference in the mortality of the two classes to this circumstance alone—but hardly with any justification. Against this one-sided view we must remember that married persons show a lower mortality at all ages—even the highest, whereas the disappearance of the degenerates should on the whole be completed during the earlier years.

It has also been suggested that the case rests upon the economically superior position of those who can afford to marry and that it is only a special result of the beneficial effects of affluence. But this is certainly not true. The bulk of the people marry without troubling much about the future and if any married couples have at the commencement of their married life a certain material advantage it soon gets lost where there are children to be brought up.

That it is not the selection but the married state itself which is the favourable factor can also be seen from the high mortality among the widowed and the divorced. (See Table I.) In any case it is an important fact that the contraction of marriage signifies an increase in the mean expectation of life.

*Prinzing*¹ has calculated for Bavaria that a married man aged 30 has an expectation of life longer by 5 years than a bachelor of the same age, and a married woman in spite of the dangers of pregnancy and child-bed one longer by one year than a spinster of the corresponding age.

b. Advantages to the offspring.—If marriage is an important hygienic institution from the point of view discussed so far, it is even to a greater extent a safeguard to the succeeding generation. The fruit of connubial intercourse is, to begin with, better protected in the mothers' wombs than is the illegitimate child, it has much better chances to withstand the perturbations of labour, better prospects of receiving at the mothers' breasts the nourishment provided by nature and is usually looked after with greater attention during the early years, so full of dangers, as well as afterwards. Herein lies the great interest which society and the State have in marriage and in the prevention of the procreation of illegitimate children. On these points also, statistics show everywhere the same results. The subjoined table gives a comparison of the numbers of stillbirths in different European countries for the year 1893-94.

TABLE II.²

Of 1,000 births there were still births:

	Legitimate Births	Illegitimate Births		Legitimate Births	Illegitimate Births
Italy	39	51	Prussia	32	46
France	44	74	Austria	27	42
Belgium	43	63	Hungary	23	31
Holland	44	81	Denmark	24	32
Wurtemberg	32	35	Norway	27	41
Bavaria	30	36	Sweden	25	33
Saxony	32	41	Finland	26	47

As regards the mortality of children born alive the following figures, worked out by *Boeckh* after a most careful study

¹Allgemeines statist. Archiv. V. 1898.

²*Westergaard*, loc. cit. p. 348.

of the Berlin statistics for the year 1885, will serve as an example:

TABLE III.¹

Berlin, 1885.

Of 1,000 births there survived:

Age	Legitimate	Illegitimate	Age	Legitimate	Illegitimate
Birth	963	943	1 $\frac{1}{4}$ year	709	488
1 Month	911	828	1 $\frac{1}{2}$ "	691	471
2 Months	889	767	1 $\frac{3}{4}$ "	679	455
3 "	868	716	2 years	669	446
6 "	813	613	3 "	642	425
9 "	769	557	4 "	624	412
12 "	735	515	5 "	612	405

If we examine into the causes of death among illegitimate children we find that those which emanate from digestive disturbances predominate. And this is easy to understand. For it is obvious that illegitimate children are not as often breast-fed as those born in wedlock and that less care is exercised in their artificial nutrition.

III. Injuriousness of marriage where health is defective or age unsuitable.—Sexual intercourse is hygienically permissible only to such persons who are sexually perfectly mature, healthy and in full vigour, as only from healthy and mature parents can a healthy progeny be expected. If immature persons marry the premature sexual intercourse is as injurious to them as it is to unmarried individuals, and this is proved by the markedly higher mortality among young married people when compared with those that are not married. This difference is particularly noticeable in the case of young men. Thus there died in Oldenburg in the years 1876-85 annually on an average: out of 1,000 single men between 15 and 20 years old, 6.3; out of 1,000 married, 8.7; out of 1,000 unmarried women of the same ages, 5.7; out of 1,000 married, 6.2.

Persons of advanced age should also be dissuaded from

¹Quoted by *Westergaard*, l. c. p. 391.

marrying just like those who are immature. I know quite a large number of cases where men over 50 years of age were no longer equal to the demands of a new marriage; it was particularly the heart and the blood-vessels that could not stand the severe "rush of blood."

IV. The constitution of the offspring dependent on that of the parents.—Of the greatest importance to the succeeding generation is the physical constitution of the parents. This is a fact which is very insufficiently recognised by the laity as well as by the medical profession. It ought to be the guiding standpoint at the contraction of marriages and while exercising the procreative act during marriage, that it is a dereliction of duty to bring children into the world which will probably be the subjects of congenital anomalies, affected with disease, or a predisposition to disease or devoid of vitality and unable to resist against extraneous injuries.

There is no need for me to explain to my medical readers that we are in everything essential the creatures of our parents and of our ancestors, that it is on the whole predestined by the nature of the germs from the combination of which we emanate what we are and what we are to be.

By no means everything that is given us is good! The parental germs themselves may, to begin with, be possessed of inherited deficiencies, or they may have suffered by injuries which affected the parental body, or they may not have been perfect on account of the immature or too advanced age of the parents. I do not mean in this short survey to go at all into the complicated question whether so-called "acquired peculiarities" of the parents can be inherited by their descendants. Though the theoretical interest in this point is very great it has not practically that high importance which has been attributed to it. Thus *f. i.* the question whether a tuberculous father from whom his descendants have inherited a predisposition to tuberculosis was himself hereditarily predisposed to the disease may be very interesting, but what is practically important is the undoubted fact that tuberculous fathers bequeath exceedingly often a predisposition to tuberculosis.

I will now enumerate briefly what we know of the injuries to and the deficiencies of the germ-substances which are transmissible to the progeny:

a. Age of the parents.—Where the parents are much too young (mother under 20, father under 27) the children are not infrequently delicate; malformations and idiocy are also more frequent among the children of young parents than among those of the fully mature.

Equally unfavourable is advanced age of the parents (mother above 40, father above 50). It is worth mentioning that very young mothers and those approaching the climacterium are more prone to give birth to twins than women in their prime.

b. Number and rate of successive pregnancies.—All that weakens the organism of the parents acts in the majority of cases debilitatingly on the descendants also, and this is particularly the case where the mother is delicate, either because the ovum possesses little vitality or because the nutrition of the embryo is insufficient. It is here necessary to point out that the maternal organism suffers in a manner calculated to injure the descendants where pregnancies follow each other too rapidly or where they are too numerous. Statistics of infantile mortality show that on an average the third and fourth child of the same woman are the strongest and that beginning with the fifth, sometimes with the fourth, their vitality diminishes pretty rapidly. The unfavourable influence is especially great where pregnancies follow each other within one year. *Westergaard*¹ has worked out that out of 100 children who were born within one year after a brother or a sister 19.9 died before they reached their 5th year; but out of 100 who were younger by more than two years, only 11.8. Even those children who were born between one and two years after their predecessors showed a fairly higher mortality than children who followed after a longer interval. Pregnancies should therefore not succeed one another more rapidly than at intervals of two and a half years. Only thus it is possible for a mother to suckle her children sufficiently long.

¹Loc. cit. p. 371.

c. Economic conditions.—If the younger children of prolific marriages are on an average weaker than the older ones, this is partly due to economic conditions. The greater the number of children the more difficult it becomes to provide them with sufficient and good nourishment and to bring them up with the necessary care. For this reason also the unrestrained and proletarian procreation of children is open to objection. There should be no more children brought into the world than can presumably be fed and reared.

d. Diseases of the parents.—Many chronic and exhausting diseases are productive in the descendants of feeble vitality, diminished resistibility, slow and incomplete development, and sometimes of diseases or predispositions to disease which are characteristic of the respective parental conditions.

This applies especially to certain chronic metallic intoxications (as *f. i.* lead-poisoning) which are harmful to the children if either the father or the mother suffers from them, syphilis, tuberculosis, mental and nervous diseases, alcoholism and morphinism.

It is well known that syphilis can be transmitted directly from parents to children, thus giving rise to congenital secondary or tertiary lesions. The infection may proceed either from the father or from the mother. But even when they do not actually receive the infective virus, the children suffer through the parental syphilis, as is proved by the large number of miscarriages and still-births and also by the great infantile mortality and by the frequent occurrence of stunted and backward children among the offspring of syphilitic individuals. It has already been mentioned that such children are frequently highly predisposed to tuberculosis.

The children of tuberculous parents become themselves very often tuberculous. It is probably very seldom indeed that they are infected with tubercle bacilli directly at the conception or during pregnancy, as is the case with syphilis and some other infectious diseases such as small-pox, scarlet fever, etc.; at least it would seem so judging from the exceedingly small number of people affected with congenital tuberculous processes of a manifest character, and also from the fact that not in one single

case has an inherited infection been traced to the paternal semen. To some extent the frequency of tuberculosis among the children of tuberculous parents is probably due not so much to direct hereditary transmission as to the circumstance that in their extra-uterine life such children are as a rule in a very marked degree exposed to the danger of infection.

It would however in our opinion be altogether wrong to attribute the occurrence to the last-mentioned factor only. It seems to us to be established beyond doubt that the children of tuberculous parents are not only very often of weakly constitution and ill developed like the children of parents suffering from any chronic disease, but that they possess a specific inclination to tuberculosis. This view derives support from those well-known sad cases where all or almost all of the children of a family succumb more or less rapidly to tuberculosis after having reached apparently in perfect health the second or third decade.

Very often indeed the whole physical constitution of descendants from tuberculous parents is so characteristic that we speak of a tuberculous habit of body or diathesis; tall stature, long and flat thorax, overhanging shoulders, weak muscles, a poor general state of nutrition, a small heart, narrow blood-vessels, irritability of temper and limited nervous endurance.

An incontestable fact is also the frequent hereditary transmission of a predisposition to mental disturbances and nervous diseases from one generation to another. What is characteristic in these cases is the extraordinary diversity of forms which the disease assumes and in which the inherited degeneration or deficiency of the nervous system becomes apparent. All kinds of nervous disease may be noticed, from light manifestations of irritability, eccentric tendencies and hypochondriasis to the severest forms of epilepsy, insanity and idiocy.

It cannot be sufficiently emphasized how injurious the abuse of alcohol is to the succeeding generation. This harmfulness of alcohol manifests itself on the one hand like that of other poisons by a generally impaired vitality, development and resistibility of the child and again specially in a severe derangement of the nervous system which is apt to assume the most variable forms.

e. Inherited defects of the germinal cells.—

Certain morbid predispositions are inherited from generation to generation and are doubtless based upon some specific defect in the embryonic elements. It is however particularly worth mentioning that a link in the chain of the generations may now and then escape the disease though the predisposition to it has been latently inherited, as f. i. by grandchildren from their grandparents, etc. (atavism).

Here again mention must be made above all of the mental and nervous diseases which often cling tenaciously to some families. In all the severe cases of inherited predisposition the degeneration of the germinal elements is already evidenced by outwardly noticeable anomalies, the so-called signs of degeneration. Hereditary from generation to generation is further a predisposition to certain metabolic disorders; this is particularly the case with gout and also with jaundice, renal calculus, diabetes mellitus, diabetes insipidus, alkaptonuria and cystinuria.

There is also an inherited predisposition to cancer, to premature arteriosclerosis and consequently apoplexy, to emphysema of the lungs and to certain skin diseases. It also seems that a tendency to tuberculosis can be hereditary through several generations.

A most remarkable phenomenon is the hereditary transmission of certain malformations which affect either single organs or extremities only, or the entire body. To this category belong the presence of supernumerary fingers or toes, hare-lip, cleft palate, non-development of the female breast, dwarfs, giants, myopia, colour blindness, hæmeralopia, hereditary cataract, atrophy of the retina and retinitis pigmentosa, warts, birth-marks (*nævi*), neuromata, neuro-fibromata, cartilaginous exostoses, progressive deafness in consequence of sclerosis, deaf-mutism, hæmophilia, etc.

f. Consanguinity.—It is in the hereditary transmissibility of certain predispositions to disease and malformations where the danger of procreation among blood-relations lies. Such procreation is not *per se* injurious or only so when it is continued through many generations in which case the mar-

riages may prove sterile. The disadvantage is that near relations possess the same inherited predispositions and that a combination of these injurious influences may attack the embryo. On the other hand there is an unfavourable element in the union of two individuals who spring from races too wide apart as is proved by the limited fruitfulness of such marriages f. i. of those between Jews and Christians.

V. Choice of husband or wife.—The choice of a husband or wife is therefore an exceedingly serious matter. But there should not be any exaggeration about it. No one is perfectly normal and entirely free from inherited predisposition to disease. Undue anxiety would result in there being no marriages at all. It must also be borne in mind that just as in certain families morbid tendencies increase (degenerative heredity), so in others they diminish; that by a suitable mode of life it is possible to arrest certain predispositions in certain individuals (this applies f. i. to mental diseases and tuberculosis in a very marked manner); and particularly, that by a continued pairing with descendants of healthy families abnormal predispositions may be annihilated altogether; provided always that the degeneration of the germinal elements has not gone too far.

We may therefore lay down something like the following as a rational guide:

People afflicted with serious malformations, degenerates such as idiots, imbeciles, lunatics, epileptics, drunkards, habitual criminals and chronic sufferers, such as tuberculous persons and syphilitics in the secondary stage, should absolutely be excluded from procreation. Equally unsuitable as procreators are individuals whose physical development is not complete or whose sexual character is imperfectly marked. It is particularly necessary to dissuade from marriage women with poorly developed breasts and hips, women who have never menstruated or menstruated irregularly and women with ill-developed and imperfect pelves as a consequence of rickets. In fact only such persons should beget children who are perfectly healthy, strong and well-nourished. Individuals who are either too young or too old are unsuitable for procreative purposes.

It is essential to make inquiries into the history of the ascendants of persons about to marry. Important above everything in this connection is the physical constitution of the parents and of the brothers and sisters. But we must try to go as far back as possible, especially where the antecedents of the parents and of their brothers and sisters, as well as those of the brothers and sisters of the candidate for marriage are not quite satisfactory. The further back the anomalies and morbid predispositions are demonstrable among the ascendants, the more frequently they have occurred among the members of any one generation, the more marked those abnormalities and signs of degeneration are, so the more the individual in question is himself or herself predisposed, and the probability greater, that he or she will be equally affected or transmit that predisposition to the subsequent generation. If the particular abnormality or degenerative sign is serious, procreation must not take place under any circumstances, even if the individual in question may for the time being appear to be in perfect health. The more insignificant the hereditary susceptibility, both as regards the nature of the abnormality and also its degree, the more easy it will be to permit the marriage, or procreation respectively, so long as the individual concerned may be regarded as normal. The decision will often be extraordinarily difficult and fraught with the most serious responsibilities. In any case it will be necessary when giving the permission to the individual concerned to take great care that the other partner descends from a stock in which the same hereditary predisposition is not present and that the married couple should in their mode of life and in the procreation of children take every precaution calculated to counteract the hereditary morbid proclivity. Marriages between blood-relations should always be opposed.

The choice of husband or wife is however of importance not only from the point of view of the expected offspring but also from that of the other partner. Particular attention must be directed to the danger of transmission of acute and chronic infectious diseases from husband to wife or *vice-versâ*. In practice it is principally tuberculosis and venereal diseases—gonorrhœa and syphilis—which come into question. As regards

the former it is at least necessary to warn against the great risk of infection if it is not possible to prevent the marriage altogether. Persons who have suffered from syphilis or gonorrhœa must under no circumstances marry or indulge in sexual intercourse at all until it is absolutely certain that they are no longer contagious. On this latter point it is regrettable to have to say that many medical men act with unpardonable carelessness or lamentable ignorance. No practitioner should allow a syphilitic individual to marry and beget children before the expiration of at least three—or better still four—years from the commencement of the illness, and then only if the treatment has been a thorough one and no symptoms whatever have shown themselves for at least one year. As to gonorrhœa, there is hardly a medical man who does not know that gonorrhœa in the female when it has once attacked the internal organs is practically incurable and that the chronic condition in the male may continue for years with such slight manifestations that it is possible only by very frequent and most searching microscopic and endoscopic examinations to obtain conclusive proof of its disappearance. It is well known that such chronic and hardly recognisable gonorrhœas are capable of producing in healthy women most virulent acute attacks of the disease. The responsibility of the practitioner is therefore enormous when giving his permission to a patient, who has had gonorrhœa, to marry. He is entitled to grant that permission only after having exhausted all the means at his disposal which can enable him to arrive at a definite conclusion.

With regard to the mode of life of married individuals it is the duty of the physician to make it clear to them that they must consider their health not only for their own sakes but that they should avoid everything that is likely to injure it for the sake also of the expected offspring. The medical profession ought, from this point of view, to oppose to the best of their ability the constant round of pleasures of which people are so fond and also the habitual indulgence in alcoholic liquors or other narcotic substances.

Tight-lacing should be opposed, as it may act injuriously especially on the embryo.

All the circumstances which preclude marriage preclude as a matter of course the procreation of children if they arise after a marriage has taken place.

The practitioner will do well in all cases where the procreation of children is permanently or temporarily contra-indicated, to recommend genuine sexual continence. All preventive practices which permit sexual intercourse while avoiding conception seem, if carried on for any length of time, to cause more or less injury, and most of them are also unsafe. This subject will be dealt with more minutely in a subsequent chapter; it is sufficient to point out here that it is the more important for the practitioner to be very careful in recommending these practices as they are apt to find their way to healthy individuals, thereby causing injury to them as well as to the community by preventing the creation of a vigorous progeny in numbers commensurate to the strength and greatness of the nation.

III

Congenital and Inherited Diseases and Predispositions to Disease

III

CONGENITAL AND INHERITED DISEASES AND PREDISPOSITIONS TO DISEASE

By **Professor J. Orth** (Berlin)

IN order to obtain a clear conception of the occurrences and significance of congenital and inherited diseases and predispositions to disease, it is in the first instance necessary to possess a notion as to the meaning of the words "inherited," "congenital," "disease," and "predisposition to disease." This is the more requisite as medical terminology unfortunately does not in this matter afford us any definite rules and logical conclusions, and as, particularly in the case of the designation "predisposition to disease" or "predisposition" it has often been remarked that where conception is at fault a good name goes a very long way. The well-known saying of Bacon, "*Prudens interrogatio est quasi dimidium scientiæ*" might very well be altered into "*Prudens definitio est quasi dimidium scientiæ*." I shall therefore try first to render the ideas intelligible and will afterwards deal with the occurrence of congenital and inherited diseases and predispositions to disease in general, but with special regard to the question of heredity and its importance in pathology.

The meaning of "inherited" and "congenital."—The words "inherited" and "congenital" are often used synonymously, but there is no justification for it because although everything inherited is also congenital, it does not necessarily follow that everything congenital is also inherited. The opposite of "inherited" is "acquired." Acquisitions are either extra-uterine or intra-uterine; if the latter they are congenital, but inherited.

All is congenital that is present in or about an individual at the time of his or her birth. It is not essential that the congenital peculiarities shall be recognisable in the newly-born infant immediately after birth, either by an external or by an internal examination; there may be, to begin with, a latent condition from which the particular abnormality or peculiarity emerges at a subsequent period, perhaps after many a year, and which though not recognisable at birth is nevertheless inherent in some shape. This applies to normal as well as to abnormal qualities. Whether a newly-born infant is of the male or of the female sex is under ordinary circumstances visible immediately after birth, but the development of the sexual glands or of the female breast respectively does not take place before puberty; and as to pubic hair or the beard there is not at birth a trace of them, yet we do not doubt that they are congenital phenomena, and that their origin dates from birth.

Such latency, such an appearance of peculiarities later in life is not seen only in the development of the sexual attributes or in connection with general conditions but also in individual qualities and especially in family characteristics. Certain peculiar family features are at times decidedly recognisable in newly-born or very young children; there are however a number of peculiarities as f. i. the general build, facial expressions, the nature of the hair, and also functional distinctive phenomena and proclivities, etc., which make their appearance at a subsequent period and as to which no one has any doubt that they are congenital possessions.

The matter is no different as regards disease. It is f. i. well known that syphilis is capable of producing intra-uterine symptoms which are recognisable immediately after birth, that in most cases undoubted signs of the disease become apparent at least soon after birth, and that there is consequently a congenital syphilis. But it may also be considered as a fact that there is a "late congenital syphilis,"¹ a form of the disease the symptoms of which do not become apparent until perhaps many

¹A restriction follows later on.

years afterwards, though its cause must have been latently present in the body of the sufferer from the time of his birth. The syphilitic infection is in such cases necessarily congenital and the disease itself which is sometimes, though not with certainty, recognisable, was either present at birth (latent syphilis), or at least prepared (latent syphilitic infection). The same thing may happen with respect to obesity, giant growth, gout, etc.

What is not inherited.—What is to be regarded as inherited in these congenital phenomena? Surely not that which has arisen in consequence of disease in the fœtus (f. i. intestinal obstruction due to a cicatrix following an intussusception) or through abnormalities in the ovum (such as constrictions or amputations by amniotic bands or coils of the funis, growth into the placenta, etc.); as for these conditions the maternal organism has no direct responsibility. Nor can we regard as inherited, anomalies in which the uterus is secondarily involved, as for instance fœtal deformities resulting from pressure produced by deficiency of liquor amnii. But I go further still, and maintain that what the fœtus receives from its mother in the course of its development is not inherited, because the essence of heredity does not consist of the circumstance that the descendants have obtained a particular peculiarity from their ascendants or that a disease has been transmitted to them by their parents or even their ancestors. If a hitherto healthy child is through kissing or in any other way infected with syphilis by its parents nobody would think of calling this hereditary syphilis any more than he would consider as hereditary tuberculosis a case where a child born free from this disease becomes tuberculous through his parents, grandparents or any other relatives. If a mother transmits at any time during her life some acute infectious disease to her child nobody ever thinks of mentioning the word “inherited,” yet why should it be otherwise when the transmission has taken place not during extra-uterine but during intra-uterine life?

Placental infection.—There can surely be no difference in the essence of the process because the placenta has played an intermediate part, that is, because the infection is a placental

one. Whether it is through the milk that a mother conveys morphia to her nursling, whether it is through a tuberculous udder that a cow conveys tubercle bacilli to her calf or whether that conveyance takes place through the blood of the placenta, it cannot make any appreciable difference. And if any one holds the extraordinary opinion that conveyance through the milk is an hereditary transmission, what about the milk of a tuberculous cow that infects with tuberculosis not her own calf but a strange one or a human suckling? The essence of infection cannot be any different if under exactly similar circumstances it attacks different individuals. But if conveyance through the milk cannot be called hereditary transmission why should we speak of such when the conveyance takes place through the blood? Such a conveyance as *Lubarsch* rightly says is only a special kind of metastasis, a metastasis in another individual, but in reality nothing more than what takes place when an infective agent is transmitted from one individual to another by injection into the blood. Where have we here a hereditary transmission? And how about infection during labour? How far does heredity go and where does acquisition begin?

There are, to begin with, general biological reasons why we should not consider as hereditary all that is derived from the mother during intra-uterine life. In the amphigynous propagation of the species the value of the male germ is for hereditary purposes equal to that of the female, for we see how anxiously—if we may use such a term—nature looks to it that at the fecundation of the ovum the future new creature shall receive just as much chromatin from the paternal as from the maternal germ. Though it is not by any means proved as yet that the chromatin is in any way the carrier of heredity its behaviour gives us a sure indication as to the general nature of the paternal and maternal potency, of the paternal and maternal inheritance. Were we to admit post-conceptional influence on heredity on the part of the mother the value of the maternal progenitor with regard to heredity would be quite different from that of the paternal; in such case the mother would be capable of transmitting hereditarily much more than the father. In any case this could happen only in viviparous

animals, and particularly in mammals, and not even in all of these to the same extent because in aplacentals the conditions are entirely different than in placentals. If in the discharged egg of an animal changes take place in the developing embryo owing to external influences, it is perfectly clear that we have before us not inherited but acquired conditions,—is there any material difference if the same changes occur in an egg while it happens as yet to be situated inside the genital organs of the mother? Tubercle bacilli have been introduced into hens' eggs and tuberculosis thereby produced in the chicks—this is surely no inherited tuberculosis; and wherein does the difference lie if tubercle bacilli, the syphilitic poison or other causes of disease are transferred from the mother through the placenta to a human embryo before its full development? We have no more right in such cases to speak of inherited tuberculosis or inherited syphilis than in the above-mentioned experiments on chickens.

And how about those animals which are oviparous as well as viviparous? Is in their case the possibility of hereditary transmission a variable one, that is smaller in the offspring discharged with the egg and greater or more lasting in those that are born in an advanced state of development? No, all that the offspring receives in the course of its development after conception is acquired and not inherited, no matter at what period received, whether intra-uterine or extra-uterine, no matter in which way, whether through the blood, through the milk or otherwise.

What is acquired.—Everything is acquired that arises through the influence of external agencies on the developing or fully developed individual, and for the fœtus in its mother's womb every agency is external that proceeds from without it, whether it be situated within the maternal body or outside of it. The fœtus is in this respect not a part of its mother's viscera, but an independent being possessing its own life from the very beginning. A white woman with child by a negro carries in her womb a mulatto fœtus which can be no portion of the maternal body as it is not possible for a white person under normal circumstances to have one part of herself so

different in racial type as a mulatto foetus is from a pure white. We therefore arrive at the following conclusion: All that an offspring receives from its parents after conception is acquired; whatever it receives after birth is an extra-uterine acquisition, and that received during its sojourn in the uterus an intra-uterine one; the latter being present at birth is consequently congenital, but it has in a scientific sense absolutely nothing to do with heredity.

What is inherited.—What has just been said practically includes what we understand by “inherited,” for there is only one meaning possible; only that may be regarded as inherited which has been imparted to the offspring through the germinal cells. This applies to normal as well as to pathological heredity. It is true that pathological heredity presents some peculiarities and points which do not arise in normal heredity, but on the whole there can possibly be no difference between them. To call one kind of heredity biological and the other pathological is in so far incorrect as pathology also is biology, and as the general biological principles apply to pathological processes the same as to normal. But the most important biological principle as regards heredity is that the offspring derive their inheritance from their ascendants through the germinal cells.

As to the parts played by the chromatin substance, by the nucleus as a whole, or by the cellular body, these are special questions into which I cannot enter here particularly as they and similar others are still awaiting final solution. For our present purposes it is quite sufficient to state that the bearers of heredity cannot possibly be situated outside the germ-cells but only in their interior, that they are firmly bound to the molecular constituents of the germ-cells with whose internal structure they are most closely connected. The substance which is the bearer of the inheritance has been designated as *idioplasma* or *germ-plasma*—the latter expression introduced by *Weissmann*¹ is the one mostly in use—and we can therefore formulate the maxim with regard to heredity, also as follows: Only through the germ-

¹*Weissmann*, Ges. Aufs. über Vererbung. 1902.

plasma does a descendant inherit from an ascendant, only that which has passed to the descendant through the germ-plasma can be regarded as inherited.

Germinal infection is not heredity.—Consequently there can be no question of heredity when the new individual receives something which has been introduced accidentally by the germ-cells, if f. i. a spermatozoon enters into the ovum which it impregnates, or in other words into the future embryo, accompanied by a tubercle bacillus. It is immaterial whether the bacillus adheres to the exterior of the spermatozoon or whether it lies in its interior, if there is room, provided that the molecular structure of the spermatozoon, that is the germ-plasma, has undergone no important change. Such cases have been spoken of as hereditary tuberculosis of the fœtus, but without any justification, as the germ-cells have not produced the tuberculosis; they were merely the accidental carriers of the infective virus. We may therefore speak in such a case of a germinal infection, as opposed to the placental infection discussed above, but this can never be an inherited tuberculosis; we might at the utmost speak of pseudo-heredity. The best illustration of this is furnished by *Friedmann's*¹ experiments on germinal tuberculous infection in rabbits. By injecting immediately after the copulation of two healthy animals a broth of artificially cultivated tubercle bacilli into the vagina of the female animal, so that it became mixed with the seminal fluid, he succeeded in finding tubercle bacilli in the embryos of the first week, especially of the sixth day², but only in them and not in the maternal body. And though tuberculosis could not be shown to exist³ there was the beginning of it, an infection with tubercle bacilli, and no one will doubt that it came into the ovulum, and thus into the embryo, along with a spermatozoon. We may therefore speak of a tuberculous infection produced by germ-cells, but would it occur to any one to call this an hereditary infection or hereditary tuberculosis, should

¹*F. F. Friedmann*, Exper. Stud. über die Erbllichkeit der Tuberkulose. Zeitschr. f. Klin. Med. Vol. 43, p. ii. 1901.

²Later also, as I am informed.

³I am informed that subsequently there were also none.

the fœtuses really become tuberculous, that is develop tuberculosis, although there was nothing tuberculous to inherit from the parent animals? And would it be any different if the tubercle bacilli were not added artificially to the spermatic fluid but came from the same organism as the latter? Certainly not. There is just as little heredity in the one case as in the other and if a human fœtus were to receive from its father an infective virus along with the spermatozoon this would no doubt constitute a germinal infection, and if the child is born infected, a congenital infection, but as to heredity the whole process would have absolutely nothing to do with it. And what has been said with respect to the paternal germ-cell applies equally to the maternal one, the ovum. Only when the germ-cells have undergone an alteration in their internal construction, in their composition or perhaps only in their chemical constitution, if new peculiar conditions arise thereby in the body of the new individual—which *Weissmann* rightly designates as the soma, in contra-distinction to the germ-plasma, the bearer of heredity which as we have seen is contained only in the sexual or germinal cells—it is only then that we can speak of hereditary phenomena.

The meaning of disease and predisposition to disease.—I will now attempt to explain the meaning of the words "disease," "tendency to disease" or as it is usually called "predisposition to disease," and this I can do very briefly.

Disease is a process, a vital process, but one deviating from the normal and showing signs of injury; disease is life, but life under abnormal conditions and with abnormal aspects; where there is no life there can also be no disease, where there is no disturbance of vital processes showing signs of injury, there is also no disease. The external cause of a disease as f. i. parasites may be present, there may be an infection, but an infectious disease as a consequence of that infection¹ does not begin until the parasites occasion disorder in the vital processes, until the latter are injuriously disturbed. It is absolutely necessary to

¹Serious misunderstandings are apt to arise if, as it is often done, no sharp distinction is made between infection and infectious disease, and if the disease as such is also called infection. The latter term in reality only means "contamination."

distinguish between the notions "cause of disease," "parasites" and "disease." A man may harbour in his mouth virulent diphtheria bacilli without being ill; he has no diphtheria, he is not diphtheritic, although he carries about with him the causative agent of diphtheria and although he can make others diphtheritic by conveying to them those causative agents. The rabbit-embryos of *Friedmann* contained tubercle bacilli but they were not tuberculous as there were no demonstrable signs whatever of disordered vitality, no morphological changes and no disturbances of development. If there has been in any particular case a congenital transmission of the cause of a disease we are not justified in speaking of a congenital disease as long as there are no demonstrable morbid disorders of vitality. We can only speak of a congenital infection, because in my opinion infection begins with the transmission of active and living parasites. It is true that the usual form of speech does not in cases where a disease springs from an infection differentiate very accurately; we speak f. i. of a late congenital syphilis though in reality this is not quite correct as the syphilis as such, that is the disease with all its symptoms is not present, or at least not noticeable at birth and as nothing but the cause of the disease is latently inherent. The circumstances are here totally different than in the case f. i. of the secondary sexual characters, because these are already formed at birth, whereas of the disease there is nothing present and its commencement dates from a subsequent period.

As to what is to be understood by tendency to disease or predisposition to disease, opinion is very much divided. This is evidenced by the literature on the subject. In my judgment it ought to be taken for granted that what comes here into question are bodily conditions, the peculiarities of the build, of the chemical composition and of the activity of the organic tissues and the qualities of the individual constitution.

The human body is not without protection at the mercy of external causes of disease and particularly at that of parasites; on the contrary it possesses quite a large number of protective agencies partly morphological and partly biological which, being to a great extent regulating arrangements, enable it to

offer resistance to abnormal conditions of life and to external causes of disease the tendency of which is to generate disorder in the vital processes, viz.: to produce a disease; they enable it to render those causes abortive and thereby maintain the normal course of the process of life. Everything which prevents that regulation from taking place, every incapacity of the body to resist external causes of disease, therefore, every peculiarity of the constitution which renders the latter unable in the struggle of the body with the causes of disease to maintain the normal course of the vital phenomena, every such peculiarity of the constitution may be designated as a tendency, as a predisposition to disease. There need not in this connection be any deviation of individual constitutions from the type of constitution of human beings as a class, there may be also typical general characteristics of constitution which though normal in themselves may represent dispositions to disease in so far as they tend to favour the origination of some particular disease or in so far as they are not capable of preventing that origination. Such are the predispositions to disease which appertain to the human body as opposed to the bodies of animals; such the predispositions by which various groups of humanity are distinguishable in a regulated manner from one another according to age, sex or race. All these predispositions to disease must be congenital and inherited, for they are a result of the phylogenetic development, they have their origin in the general characters inherent in the germ-cells.

There is however a difference as regards those peculiarities of constitution by which an individual distinguishes himself from the type of man in his normal state, which belong to him personally and which constitute his own individual personality. These are individual predispositions to disease which we designate as family predispositions when the same special peculiarities of constitution appear in several members of one and the same family. Of course not all individual peculiarities of body, not all family peculiarities of body, are predispositions to disease; they are so only in so far as they do not prevent the production of disease or in so far as they tend to favour it.

This conception of what constitutes predisposition to disease

does not contain anything mystical; it is not beyond the domain of science, and is just as capable of scientific treatment as any other pathogenetic question, though we must admit that our knowledge of the predispositions to disease does not go much beyond a few generalities.

Congenital and inherited diseases.—In coming now to the general answer to the question whether there are congenital diseases and how much heredity has to do with them, it is not necessary for me to mention that there are such diseases, as this is so well known. I only wish to point out again that strictly speaking we can call a disease congenital only if the disturbance of the vital processes which constitutes the nature of the disease was already present at birth. If that disturbance appears later it was obviously not present at birth and what was then present was at the utmost its cause only. But the cause of a disease and the disease itself—this cannot be emphasised too much and too often—are not one and the same thing. In the majority of cases it is congenital infectious diseases that we meet, anthrax, pneumonia, relapsing fever, sepsis, typhus, small-pox, syphilis, tuberculosis (rarely), leprosy, cholera (presumably), articular rheumatism, malaria, measles, scarlet fever, but there may also be fœtal diseases of another kind. By far the greatest number of all fœtal diseases, whatever their nature may be, make their appearance only during the development of the fœtus in the earlier or later months of pregnancy; an hereditary transmission of the disease is therefore out of the question. But it is highly probable that even in those congenital diseases which are of germinal origin, heredity, in a scientific sense, must, after what has been said above, be excluded, inasmuch as it is almost exclusively infectious diseases that come into consideration. It would be possible to speak of an inherited disease only where one or both of the germ-cells were specifically diseased, but this is hardly likely ever to occur in practice seeing how improbable it is that diseased germ-cells could give life to a regularly developing embryo. Nevertheless the further evolution of an embryonic structure emanating from a diseased germ-cell is not altogether impossible, and it is quite conceivable that the general ill-

development, the general want of vitality, the dystrophy so frequently observed among the offspring of syphilitic parents, may be due to the fact that the germ-cells were somewhat damaged and to a certain extent affected with syphilis. But such a conclusion is by no means necessary as all these conditions might very well have been produced at a later stage in the foetal body by toxins arising from the syphilitic virus. The observation that the danger of transmitting syphilis to the embryo is greater in proportion to the acuteness of the symptoms in the parents, may be explained either by a gradually diminishing injurious effect on the germ-cells or by a gradually diminishing virulence of the infective virus.

We may therefore draw the inference that undoubtedly by far the greatest number of congenital diseases are not hereditary and that in all probability there are no hereditary diseases at all. As regards especially the most important diseases namely those due to infection there are no doubt congenital infectious diseases produced by placental—now and then also perhaps by germinal—infection, but no such hereditary diseases.

Congenital and inherited predispositions to disease.—The conditions are totally different as regards the predispositions to disease. The general ones do not of course concern us here; we have to consider only the individual and the family predispositions. As we are not thoroughly familiar with the finer conditions, morphological as well as biologicico-chemical of those constitutional peculiarities which must be regarded as the principal predispositions to disease and which may either date from the first stages of the embryonic structure (dispersed germ-cells, incomplete differentiation, etc.), or arise at a subsequent period of the development, we are not generally in a position to demonstrate them objectively but must infer them chiefly from their results and from their action; and such inferences must always be treated with the greatest discrimination. Here we are, however, often confronted with the difficulty that it is not always by any means quite clear what is to be regarded as cause and what as effect, what as predisposition to disease, and what as a consequence of disease. In no other disease is this difficulty so markedly apparent as in tuberculosis.

Hereditary predisposition to tuberculosis.—

Heredity has always been supposed to play an important part in this disease, and—particularly since the discovery of the tuberculous virus and the recognition of its bacillary nature—numerous pathologists and physicians have attached very great value to a congenital and hereditary predisposition to it. It was at first believed that that disposition lay in the so-called scrofulous constitution, but this opinion proved to be to a great extent erroneous, as it has been shown that much (perhaps all?) of what was designated as “scrofulous” is nothing but a tuberculous process. But are we justified in denying all congenital general predisposition to tuberculosis? That germinal transmission of tubercle bacilli, in other words a pseudo-heredity, plays any important part at all is admitted by few pathologists; most of them attach the greatest weight to extra-uterine infection and there is no doubt that much of the hereditary aspect of tuberculosis is due to the circumstance that ascendants constantly infect their descendants and that as a consequence of this infection several successive generations of the same family are attacked by tuberculosis. On the other hand if we bear in mind how very prevalent tuberculosis is, and that it is hardly possible for any one to avoid exposing himself repeatedly to the danger of infection, if we consider how many individuals carry in their bodies traces of tuberculous disease without suffering from severe local or general tuberculosis, we cannot refuse to recognise that in those individuals who do suffer severely from the disease, and particularly in those frequent cases where at certain periods of development, during puberty, tuberculosis makes such rapid progress and is so soon fatal, there must be some other general constitutional peculiarities playing an important part, the more so as often enough the tuberculous parent dies at an early age and there is consequently no continuous family infection present at all. We are thus impelled to think of the variable general susceptibility of different animals, to remember that even among animals of the same class there are different races with different susceptibilities, that among animals also there are doubtless individual differences of susceptibility, and therefore an individual predisposition of a general

kind to tuberculosis. From this we must further conclude that in man as well there is latent a general predisposition to tuberculosis, and that in many family-tuberculoses this predisposition is inherited; and I see no objection to this same general predisposition being called by the name of "scrofula."

But there are in tuberculosis, besides the general, also local constitutional peculiarities, and with regard to these the same question arises, viz.: how far are they to be considered as consequences of the disease and how far as primary congenital predispositions to disease.

That many tuberculous individuals—this is especially noticeable in early youth—are narrow-chested and characterised by a contracted and flat thorax is an undisputed fact; but whether this so-called phthisical thorax was present previous to the tuberculosis, or whether it is a consequence of preceding tuberculous changes in the thoracic organs, these are questions upon which opinions are still very much at variance. If, as I consider it to be correct, the thoracic malformation is the primary event and something congenital, may it not have arisen because some phthisical ancestor acquired such a thorax, and because this acquired new condition was inherited as a predisposition to phthisis? Is there such a correlation between the bones of the thorax and the germ-cells that the alteration produced by disease in the former is to a certain extent reflected in the latter?

The discussion, started some time ago by *Freund*, and recently resumed, as to the significance of a special shape of the upper aperture of the thorax, and particularly as to the length and situation of the first rib, in connection with the origin of tuberculosis in the apices of the lungs will, to my mind, have to end with a general admission that the condition is certainly not a consequence of existing tuberculosis, but a congenital primary predisposition to apical phthisis. But who dares to decide whether the special shape of the first rib owes its existence to some primary germinal variation due to some cause or other, or whether it represents a primary somatic variation? There can be no doubt as to the primary nature of the predisposition in those cases in which a congenital narrowness of the pulmonary

artery has been the basis of a tuberculosis of the lungs; we may here safely admit that the severe congenital anomaly has favoured the production of the subsequent disease.

Other congenital manifestations of disease.—

We can find many other similar examples, as for instance the frequency of morbid changes in retained testicles or in other organs in an abnormal state of development. We may also call attention to the physical so-called signs of degeneration in individuals affected with an hereditary predisposition to mental disorders. These signs of degeneration are at least in part, probably secondary phenomena only, consequences of the altruism prevailing in the body as a whole, or, as *Roux* says, of the struggle between parts of the body, the effect of which is that changes in one part cause disturbances in other parts also—but they are nevertheless visible signs of an alteration in the constitution.

In numerous cases where family diseases, and especially also metabolic disorders, are present (congenital obesity, gout, diabetes, etc.), we have hardly any indications as yet of the hereditary constitutional abnormalities upon which they are based and which produce the predispositions to them. We know just as little with regard to those predispositions which rest on non-inherited disorders of development, as for instance tumours, for the causes of which many pathologists look in such processes as germinal misplacements, etc. It must therefore be the object of science to find out by careful research which deviations in the structure and chemical composition of the human body should be considered as congenital foundations of predispositions to disease. It is well, in this connection, to remember that it is not necessary for even the congenital constitutional peculiarities, that is the predispositions to disease, to be quite complete at birth; they may become so at a later period of development. *Vice-versâ*, not every pathological condition in young children (smallness, atrophy, dystrophy, anæmia, etc.) must be regarded as congenital, inasmuch as unfavourable external circumstances are in themselves sufficient to produce such abnormalities. Only when we shall have become familiar with the exact morphological principles, it will be possible to attempt an answer to

the second question with better prospects of success than we have at present, only then we shall be able to say how far such congenital predispositions to disease may be regarded as inherited, and how far the hereditary transmission of acquired peculiarities comes here into question.

Hereditary transmission of anomalies and malformations.—That particular physical peculiarities may be transmitted hereditarily is amply demonstrated by certain anomalies and malformations. Though they are not necessarily diseases or predispositions to disease they are nevertheless pathological conditions, deviations from the normal build of the human body, which we cannot here leave unnoticed, as they are typical of the proper predispositions to disease.

If we hear for instance that hexadactylism has been present through several generations, that a whole village (*Eycaux, Isère*)¹ in which the inhabitants have intermarried for a long time consisted finally almost entirely of six-fingered individuals and that the anomaly commenced to disappear as soon as marriages with outsiders became more frequent, thus introducing fresh germ-plasms, we are obliged to admit that the case must be one of inherited anomaly though the possibility is not altogether precluded that there were also other factors concerned which must necessarily have been present when the anomaly occurred for the first time.

In the case of hexadactylism, the anomaly has been referred to as an atavistic phenomenon,² though as *Gegenbauer* has shown, quite unjustly, but even if it were so, there must also have been some special reason why the reaction occurred in one particular individual. Besides, similar conditions as in polydactylism occur also in syndactylism, peromelia, daltonism, and other anomalies, in which an atavistic explanation is out of the question and as to which we may say with certainty that the persons who showed these malformations first did not inherit them; the anomalies must consequently have been produced by other circumstances and these same circumstances

¹*F. Devay*, Du Danger des mariages consanguins, 1862. ref. Arch. gén. de med. 1863. I p. 763.

²For details see further on.

could very well retain their activity through subsequent generations. We are compelled to think of such complications in connection with the remarkable case of *Struthers*¹ where four generations were required to produce complete polydactylism (in the hands and in the feet). In the first generation there was a sixth finger in one hand, in the second generation in both hands, in the third generation three brothers had six fingers to each hand and one of them in addition a sixth toe in one foot, and the descendants of this one, that is the fourth generation, had six digits to each hand and foot. The explanation which has been given of other cases, in which there is an aggravation of the peculiarity in the second generation, and which appears quite admissible, is here not sufficient. It has been assumed that the cause which produces the corporeal anomaly acts upon the germ-cells at the same time and in a more marked degree, so that the descendant emanating from these germ-cells presents the same anomaly in an aggravated form. It would therefore be possible in the above observation to account for the appearance of a severer polydactylism in the second generation by admitting that the original cause effected not only a somatic disturbance but also a specific alteration in the germ-plasma. But the progression of the malformation through four generations appears to be impossible unless we recognize the existence of a continuous, specific causation, especially as there was no hereditary predisposition through the other parent. The matter is still more complicated because of the fact that in this case like in many others, the malformation was not by any means present in all the descendants. We must therefore be very careful when expressing an opinion on the hereditary transmission of malformations and abnormalities, and bear in mind above all that occasionally, as I have already mentioned, such occurrences are not the primary event, but something secondary, something consequential, something necessarily dependent on a primary condition. Where the latter is inherited the consequential result is also bound to make its appearance, though it has not itself been hereditarily transmitted. For instance, club-foot may appear in

¹*Struthers*, Edinb. New Philos. Journal. July 1863.

several successive generations not because the foot deformity is hereditarily transmitted, but rather the deficiency of liquor amnii of which it is the consequence.

Influence of the mother on the foetus.—Especial caution is indicated when a change, a new condition, is present only in the mother and the child; there is of course nothing hereditary if the change occurred in the mother during pregnancy. It has been asserted for instance that cicatricial changes which have taken place in pregnant women in consequence of injuries, have shown themselves in analogous positions on the bodies of the children subsequently born; similar experimental observations have also been reported.¹ Of course there can be nothing hereditary in this, as the whole process has nothing whatever to do with the germ-cells, and is at the most an intra-uterine transmission, but we are absolutely at a loss to explain it, inasmuch as the foetal body was already moulded before the injury to the mother occurred, and a communication could only have been possible through the placenta, which communication we can only think of as one of a chemical nature. If we consider that in most of the cases the change in the offspring did not by any means correspond exactly to that in the mother, and that there was only a change of some kind, if we bear in mind how often in recent times surgical operations of various kinds have been performed upon pregnant women, without the foetuses undergoing any corresponding changes, we should probably feel inclined to regard those rare cases where the child has apparently participated in the acquisition of a new morphological peculiarity on the part of the maternal body, to attribute them to accidental coincidence rather than to established relationship.

This applies to an even greater extent in those cases in which the maternal body is not visibly altered, where the mother has received only mental impressions of a special kind or allowed herself to be influenced by the products of her imagination.

The “maternal impressions” of pregnant women.—To the first group belong the so-called “maternal

¹*Exner*, Sitzungsber. d. K. K. Ges. d. Ärzte in Wien. Sitzg. vom 18 Febr. 1887.

impressions" of pregnant women: Mental impressions, as a rule of a disagreeable and repugnant nature received by pregnant women, are supposed to be the cause of changes in the external physical form of the children subsequently born, of changes similar to the agencies which produced the unpleasant impressions in the mothers; similar, but by no means alike, and even the similarity was in not a few of the reported cases only very remote. We may repeat here what has already been said on the correlation between mother and child and on the possibility of influence of the former upon the latter; it is only through chemical substances that such an influence is at all conceivable, but as to "how" this influence acts, this is in my opinion quite beyond understanding, particularly because it is not a question of arrested development of physical parts, but, as a rule at least, of atrophy or reaction in the differentiation.

By far the greatest number of cases of "maternal impressions" relate to women who have reached the second half of the stage of pregnancy or at least a period when the body of the fœtus has already received its form. Incomplete formation of extremities could therefore at the most be caused by a disappearance of parts already existing; for hare-lip to be produced it would be necessary that the definite formation of the lips already completed should be destroyed and replaced by a condition of an earlier period of development,—in a word it only needs weighing all the circumstances of the case to come at once to the conclusion that a direct correlation is here impossible. The few cases in which the correlation seems to exist are noticed and recorded, others more numerous, in which the children do not exhibit anything of a striking nature, are ignored altogether.

Different to these influences upon children in the course of their development, are the influences on the germ-cells before copulation, which may proceed not only on the part of the mother, but also on that of the father. As it is changes in the germ-cells which come here into question, it is possible for the new individual emanating from them to develop a new quality which is hereditary, seeing that it is based upon alterations in the germ-plasma. But how do alterations take place in the germ-cells, in the germ-plasma?

How do alterations in the germ-plasma occur?—These also have been attributed to mental impressions. *Von Esmarch*¹ narrates the case of a woman who was one day very much impressed by a preserved fœtus and particularly by its small lower jaw; the same evening fruitful copulation took place, and, strange to say, the child resulting from the same had in addition to other abnormalities a misshapen lower jaw. If the ripe ovum became on that evening impregnated, it must already have left the graffian follicle, and consequently have ceased to be a part of the maternal organism, even if copulation took place some little time afterwards. Further influence upon it on the part of the maternal body could therefore be exercised only through chemical action; but how is it possible for a mental impression to produce such a chemical action on an ovum lying freely, say, in one of the Fallopian tubes that the individual subsequently emanating from that ovum should exhibit corporeal conditions similar to those of the object which created the mental impression? How can f. i. a white woman who catches sight of a negro while she is copulating with a white man give to the child resulting from this copulation a coloured skin? There certainly are many things in this world of ours which are beyond the grasp of our school-learning; but where there is absolutely no possibility to explain a certain alleged fact, we are surely justified in demanding first that that fact should be demonstrated without the shadow of a doubt. *Post hoc ergo propter hoc* is no admissible proof, and we are therefore entitled, for the present, at any rate, to doubt the fact of correlationship between mental impressions during or shortly before fruitful copulation and special changes in the body of the child.

We may say the same thing with reference to the belief that mental representations of certain real objects, that is products of the phantasy, during copulation are capable of influencing decisively the physical formation of the begotten child. The sinful thought of Edward the husband and of Charlotte the wife, in Goethe's "Wahrverwantschaften," both of whom imagine that they have committed adultery with their respective

¹*v. Esmarch-Kulenkampf, Die elephantiasischen Formen. 1886.*

lovers Ottilie and the captain was really nothing but fancy, if the only proof of guilt lay in the circumstance that the child resembled in its facial features not its parents but their lovers.

More within our comprehension is another possibility, namely that changes have taken place in the germ-cells during the interval between their discharge and their copulation, through the action of chemical agencies. It has been asserted, and specially by *Krafft-Ebing*,¹ that otherwise sane and sober parents may produce mentally deficient, idiotic or epileptico-idiotic children if they have sexual intercourse when in a state of drunkenness. Inherited insanity does not therefore come here into question,—for the parents are not insane,—but a newly arisen mental disorder supposed to be due to an acute alcoholic intoxication. There certainly is nothing against the supposition that the alcohol which is scattered all over the body may penetrate also into the germ-cells, even if they have been already discharged into the sexual ducts, and produce in them molecular changes which affect particularly those parts from which the cerebrum of an eventual fœtus evolves. It is not inconceivable that this disturbance in the germ-cells may, like other phenomena of an acute intoxication, be of a temporary character and that permanent injury is caused to the descendant only if copulation takes place before the effect of the alcohol has disappeared, whereas if it occurs when this effect has passed away the fœtus suffers no consequences. It is thus perhaps that we can explain the circumstance pointed out by *Krafft-Ebing* that the evil results of sexual intercourse during intoxication may occur, but that they do not necessarily occur in every case. It would still however remain unexplained how it is that the disturbances in the embryonic structure are not equally of a temporary nature, and why they become permanent. Some may even doubt whether the parents were really otherwise perfectly sane and be inclined to think that the difference in the results ought not to be attributed so much to the extent of their alcoholic intoxication as to the degree of their sanity which was not perhaps without its blemishes. In any case it is not possible to speak of inherited

¹*Krafft-Ebing*, Grundzüge der Kriminalpsychologie. 1872.

alcoholism, as it is only degenerative changes which come into consideration and which, even if they are hereditary, are only remote consequences of the effect of alcohol, but not alcoholism as such.

Impregnation.—Another remarkable occurrence which must of necessity depend upon changes in the maternal germ-cells, if it is altogether more than mere chance, is designated by the name of impregnation. It is especially breeders of thoroughbred dogs and horses who think that they have observed that male animals exert an influence not only upon their own offspring but also upon the offspring resulting from subsequent copulation with any other male, to such an extent that if a thoroughbred female is once covered by a mongrel male subsequent copulation with thoroughbred males is not productive of thoroughbred offspring, because of the influence still exercised by the first male. To my knowledge, similar observations of a definite character have not been made with respect to man, and I have not heard for instance that it has ever happened that the children of a woman married for the second time have borne any resemblance to her first husband; nevertheless, the following very extraordinary case has been reported.¹ A man affected with hypospadias which had already shown itself in three generations married a woman of a healthy family and not related to him, who bore him three children all of whom exhibited the malformation and transmitted it in part eventually to their descendants. The same woman though not hereditarily affected married subsequently another man who was also healthy and not hereditarily affected and bore him four children every one of whom exhibited the malformation of her first husband. The offspring of two of these children were normal but some of that of the other two presented the hypospadiac abnormality. Now, how can we explain such an heredity, if we may call it so, in the descendants of another man? There is no need to say that neither imagination on the part of the mother nor manifold fecundation will here serve as an explanation; the only conceivable possibility is that spermatozoa from the first husband which never reached any ova dissolved them-

¹*Lingard, Lancet. 1894, I, 703.*

selves in the woman's body and became so to speak part and parcel of it, thus producing alterations which affected also the germ-cells present in the ovaries and bestowing upon them the bodily peculiarities of the husband. We can conceive this process either as a direct causation brought about by the local relations between the blighted spermatozoa and the ova enclosed in the ovaries, or we may suppose that the maternal body undergoes a change to begin with, and that this change is afterwards in some way transferred to the germ-cells contained in the ovaries.

Hereditary transmission of acquired peculiarities.—We are thus approaching the great and important question as to the relations existing between the body and its single parts on the one hand and also between it and the germ-cells contained in the genital glands on the other, a question which is intimately and indissolubly connected with that of the hereditary transmission of acquired peculiarities. Can an individual, as *Virchow* thought, transmit hereditarily all that he has acquired, without any exception, or are there any limits to such a transmission, an opinion represented principally by *Weissmann* and opposed to *Virchow's* teaching? This is a question which has been very much discussed during the last thirty years.

According to what has been said above, every hereditary transmission implies a participation of the germ-cells; new, acquired peculiarities can only be so transmitted if the germ-plasma has undergone a corresponding change. An alteration in the germ-plasma is therefore a necessary preliminary condition of hereditary transmission of acquired peculiarities. Continuity of the germ-plasma, uninterrupted transmission of the same from generation to generation on the one hand, variability of the germ-plasma, its capability to experience changes on the other—these are the two poles round which the theory of heredity turns. Every variation in the germ-plasma arising in consequence of the variability, which it possesses, and which is admitted by all scientists, can be transmitted hereditarily if it is not counteracted by other agencies. It is obvious that newly arisen variations are more subject to such counteractions, than those which have existed for some time and become more firmly

established. It also seems that those variations which are rather insignificant persist and are transmitted more easily than marked departures from the normal type. But whether the change is great or small, whether it persists or whether it disappears soon, every variation in the germ-cells is something new, something that did not exist previously in the germ-plasma of the ascendant, the bearer of the inheritance, therefore something foreign to the latter, something contrary to it, something acquired. Inheritance and acquisition, something inherited and something acquired, these are natural antitheses, and what does not belong to the one must be attributed to the other. Every variation in the germ-plasma is therefore something acquired, something which is in my opinion not dependent on the variability originally inherent in the germ-plasma, a variability which is constantly producing changes without external stimulation, a sort of effect without its proper cause—but something as to which such external causes form the determining factor. The whole doctrine of a phylogenetic progressive development is based upon the hereditary transmission of acquired qualities on the part of the germ-plasma, and though pathological development is not a progression towards a higher type, but signifies rather a degeneration, its main process cannot possibly be any different from that of natural development. It is certainly strange that in germ-variations also a certain regularity is noticeable, that certain typical malformations are constantly recurring in the same manner (polydactylism, syndactylism, imperfect union in the extremities, in the face or in the penis, nævi, hæmophilia, colour blindness, myopia, etc.) ; but this may perhaps thus be explained, viz., that not all the parts of the germ-plasma are equally susceptible, equally variable, and that certain external causes constantly effect in the same way certain divisions of the germ-plasma (so-called determinants of *Weissmann*). According to *Wiedersheim*¹ it is mostly such parts of the body and such organs as are engaged in a continuous phylogenetic retrogression or transformation that are affected by the variations.

¹*Wiedersheim*, Der Bau d. Menschen, u. s. w. 1887.

Primary and secondary germ-variation.—It is obvious that in order to comprehend fully the nature of these processes, it is necessary that we should be acquainted with the manner in which the external agencies that produce variations by influencing the germ-plasma act; whether they have an immediate effect upon the latter, that is whether they produce a direct variation in it (primary germ-variation), which in its turn influences the germ-plasma, or whether they cause in the first instance a change, a variation, in the metazoic bearer of the germ-plasma, the soma (primary soma-variation), which in its turn influences the germ-plasma, thus giving rise to a secondary germ-variation. Between them stands the case where the external agencies produce simultaneously a variation in the soma, and an adequate one in the germ-plasma, a case which can be separated from the latter alternative only with some difficulty. Both in the second and middle cases it is possible where correspondingly altered descendants emanate from the germ-plasma, to speak without any hesitation of hereditary transmission of acquired peculiarities, because the descendants exhibit the same variation as their immediate ascendants. In the first case, however, the circumstances are different. There the soma of the bearer or of the generator of the germ-plasma shows no alteration, and such alteration only appears in the body of the descendant emanating from the germ-plasma primarily altered. In a former work ¹ on the origin and hereditary transmission of individual characteristics I have proposed that this kind of transmission should in consideration of the soma be designated as hereditary transmission of indirectly acquired peculiarities in contradistinction to the other kind, the hereditary transmission of directly acquired peculiarities. In the first case the transmission has not, like in the second, been effected by the soma directly, and it can only attain a somatic appearance if the altered germ-cell impregnates, or is impregnated by, another and proceeds towards further metazoic development.

Primary germ-variation through amphimixis.
—In the production of primary pathologic germ-variations

¹*Orth, Ueber die Entstehung und Vererbung individueller Eigenschaften. Festschrift für A. v. Kölliker, 1887.*

amphimixis plays a very considerable part. To begin with the combination of the two germ-plasmas is alone capable of giving rise to new conditions, as is amply proved by the cross-breeds of both human and animal races. How different the cross-products may turn out both physically and mentally may be seen on the one hand in the offspring resulting from the union of individuals belonging to different European nations with individuals belonging to the same coloured race (English mulattoes in Jamaica and French mulattoes in Guadeloupe are totally different from one another both mentally and physically), and on the other in the different cross-results arising from the different arrangements in the sexes of the same races: a white man with a coloured woman produces quite a different offspring than a white woman with a coloured man. Experiments on animals also show that the wider apart the germ-cells are from one another with regard to their origin the more unsuitable they are for the purpose of procreating a healthy and vital cross-breed, which is in its turn capable of reproduction. These cross-products are in consequence of their double racial origin pathologically inclined formations, but such occur also among the offspring of unmixed unions, as the result of the copulation of unsuitable germ-cells, as suggested especially by *Ziegler*.

Marriage among blood-relations, and potential heredity.—It is obvious that near relationship of the germ-cells does not as a matter of course render them unsuitable for copulation. In and in breeding, or marriage among blood-relations, is therefore as such not of very great importance as a cause of the occurrence of pathologic characteristics, and there are numerous cases both in animals and human beings where copulation by very near relations has resulted in the procreation of absolutely healthy, well-formed and thoroughly reproductive descendants. If among the offspring of incestuous intercourse insanity is occasionally observed, this is not due so much to the near relationship of the generative cells as to the probability that the incestuous parents were mentally deficient and that the incestuous act was a proof of this deficiency. In such cases it is not difficult to suppose that the insanity as such was hereditarily transmitted.

There is no doubt that the danger of marriage among blood-relations consists principally in the circumstance that it occasions an accumulation of unfavourable hereditary predispositions in one individual (potential heredity).

Primary germ-variation in the free germ-cells.

—Interrupted copulation has also been considered as a cause of the production of new pathologic conditions. Thus it has been asserted that malformations may ensue in consequence of the entrance of more than one spermatozoon into the ovum; thus the possibility has recently been suggested that certain tumours (teratomata, embryomata) may result from the impregnation of a polar globule, in which case the incomplete embryo arising from this secondary impregnation is surrounded by the properly fecundated ovum. The circumstance that the male as well as the female germ-cells may, after leaving their places of origin, remain for some time in the genital ducts of their bearer or even (the spermatozoa after coitus) in the genital ducts of the other individual, and that they must travel a certain distance before reaching copulation (see page 47), makes it possible for variations to arise in them during this interval without any direct interference on the part of the parental body. New peculiarities may thus be acquired which only become manifest in a corresponding alteration of the soma if they, the germ-cells, undergo further development. The brothers *Hertwig*¹ have shown that the eggs of sea-urchins which in the fresh state are able to repel certain foreign spermatozoa lose this resisting power after a lengthy sojourn in sea-water and are easily impregnated by these same spermatozoa. This proves that material changes may take place in the germ-cells after their departure from their places of origin, and it is possible that in man, too, such changes may occur and that they represent variations in the germ-plasma which may lead to an alteration in the soma eventually arising from it. As I have already explained, I do not think it likely that such germ-variations may be produced by mental impressions or by simple imaginary representations, but I have also

¹*Hertwig*, O. and R. *Exper. Unters. üb. d. Bedingungen der Bastard-Befruchtung*. Jena 1885.

pointed out that it is not inconceivable that they may be caused through chemical action. If the above-mentioned statements of *Krafft-Ebing* on the possible results of intercourse during an attack of drunkenness are correct, the insanity exhibited by the descendants must be capable of hereditary transmission, seeing that it springs from the germ-cells and that it is based upon an alteration in the germ-plasma. If it is merely a change of a degenerative character in consequence of altered nutrition after the discharge from the germ glands and of other external conditions, disorders may arise that are perhaps the starting point of many a miscarriage for which a plausible explanation is missing; where these disorders do not go beyond a slight extent they produce predispositions to disease in the descendant born alive, which as they are due to an alteration in the germ-plasma are also capable of being hereditarily transmitted. But these are all purely hypothetic theories, and I am not in a position to adduce any proofs of the existence of such primary germ-variations and of indirectly acquired somatic peculiarities connected with such variations.

Primary germ-variations in the germ-glands.—

It has already been pointed out that primary germ-variations may arise also in germ-cells which are as yet contained in the germ-glands. I include here the disturbance in the developmental faculty—up to complete sterility—of the generative cells of wild animals when they are kept in captivity, that is under external conditions totally different to those they were previously accustomed to. I consider that the similar conditions occurring in the human female as so-called climatic disturbances (diminution of fecundity up to complete sterility mostly in the third generation) also belong to this class, though the abnormal external conditions apply not only to the ova but also to the whole rest of the body, and there is a possibility that what takes place is not a primary germ-variation, but a secondary one which has been caused by a previous alteration in the soma.

Similar doubts arise when considering the question of chronic alcoholism in relation to mental disorders. Some psychiatrists attach considerable importance to chronic alcoholism as a cause of insanity not only in the drinker himself

but also in his descendants, and we may well ask whether the latter have inherited an acquired abnormality. Has the drunkard really become insane as a consequence of alcoholism? Or was the alcoholism a consequence of deranged mental activity? In the latter case it would not be very difficult to regard the insanity of the descendants as a result of heredity. But if the premiss is wrong—and there are drunkards who are driven to alcoholic excess not by an inner impulse, but by external circumstances and sometimes even against their will—the query arises whether it is only an indirectly acquired condition which appears in the descendants, as a result of a primary germ-variation produced by the alcohol, such as occurs, according to *Krafft-Ebing* after intercourse in a state of intoxication, or whether a directly acquired peculiarity has been hereditarily transmitted in consequence of a secondary germ-variation in the germ glands brought about by the alcoholically diseased brain, from which germ-variation the insanity of the descendants ensued as a necessary result, resting therefore on a hereditary basis.

Secondary germ-variation.—We have thus come back to the important question which dominates what we generally speak of as the hereditary transmission of acquired conditions, that is the hereditary transmission of new conditions which the soma has acquired, namely to the question what are the relations between the body as a whole and its constituent parts on the one hand, and the germ-plasma contained in the germ-glands on the other. If a decisive influence can be or is exercised on the part of the single constituents of the soma on the germ-cells enclosed in the germ-glands which are the bearers of heredity, if there is such a correlation between them that acquired changes in the soma are capable of producing adequate variations in the germ-plasma contained in the germ-cells, then it is possible for acquired somatic conditions to be hereditarily transmitted, otherwise there is no such possibility.

Relations between the body and the germ-cells.—It is obvious that the germ-cells are dependent upon the body for their nutrition. The uninterrupted transference of the germ-plasma to an unlimited number of descendants, the

phylogenetic eternity of the germ-plasma is necessarily supposed to be based upon its multiplication in every single individual, which multiplication in its turn can only go on by means of a continuous nutrition. The question arises whether the body though it is itself dependent upon an extraneous food supply is capable of exercising an alterative influence on the germ-cells by providing them with a special kind of nutrient material. I should imagine that there are sufficient reasons for assuming that it is possible by a permanent qualitative change of food to bring about an alteration in the somatic quality though there must be other factors concerned as well and it is quite conceivable that by a corresponding change in the germ-plasma a sort of accommodation to the altered nutrition takes place, thereby creating an hereditary somatic variation. Of course we must not forget in this connection that a similar mode of nutrition on the part of the descendants themselves may have precisely the same results.

Is it also due, I wonder, to conditions of nutrition that the children of older individuals whose fecundity is about to expire so frequently present a feeble constitution, and that they so often perish from want of vitality? Who can say that what we see in these cases is only a result of a regularly recurring evolution of the germ-plasma or that there do not exist also other relations?

Undoubtedly there are such relations between the germ-cells and the rest of the body. They are in the first instance of a nervous, in the second of a chemical nature. Both emanate, to begin with, from the germ-glands; these produce by reflex action nervous processes which are capable by internal secretion of influencing chemically most distant parts of the body. But does the body as a whole, do single constituents and organs of it also exercise a nervous influence upon the germ-cells? Can the germ-plasma present in the germ-cells be definitely influenced by chemical substances which spring directly from the various parts of the body, or are formed secondarily through nervous processes? Who can declare this to be impossible? And who can prove it? The third possible explanation, namely that in addition to nervous and chemical agencies there are

minute physical elements (whether we call them as *Darwin* did "gemmules" or by any other name) which are constantly carried by the blood from the smallest parts of the body to the germ-cells and are capable of causing such variations in the germ-plasma as will afterwards invest the soma springing from it with peculiar characteristics, this explanation is absolutely groundless and probably at the present time accepted by hardly anybody.

There are consequently many things imaginable with regard to the decisive relations between single parts of the body and the germ-plasma enclosed in the germ-glands; a certain scientific interpretation by what means variations in the germ-plasma may produce in this or that part of the descendants' soma similar alterations, so that they may be regarded as inherited, is not impossible; the possibility of an hereditary transmission of certain acquired peculiarities of the soma cannot therefore in principle be altogether excluded, but then this is in my opinion all that can be said. For the rest, the theory leaves us entirely in the dark and it cannot tell us anything conclusive. Thus there remains in answer to the question whether there exists an hereditary transmission of acquired conditions nothing but experience, and we must for the present devote our energy towards the elucidation of the facts which tend to show that such a transmission does exist and particularly of those facts which do not admit of any other explanation.

Hereditary transmission of mutilations.—

It may be presumed, to begin with, that the relative importance of the various parts of the body to the germ-plasma,—once we admit the hypothesis that the possible relations above described exist in reality,—that the degree of connection between parts of the body and the germ-cells, must vary according to the altruistic significance of the parts of the body. It is therefore necessary in discussing the question of hereditary transmission of acquired conditions to consider special possibilities. The question whether mutilations of non-vital parts, especially of the extremities or of the surface of the body in general, are hereditary or not, has recently been answered by almost all authors in the negative; and rightly so, considering that no

conclusive proofs have been furnished to demonstrate the existence of such an heredity, whereas on the other hand numerous weighty observations have been made in human beings which speak against it.

There is a natural mutilation which has for thousands of years recurred again and again, and which will continue to recur, because it has not become superfluous through hereditary transmission—that is the rupture of the hymen. There is even no reason for assuming that this little membrane is of any use—on the contrary, it were better if it did not exist—yet it is constantly forthcoming and it must constantly be ruptured at the first sexual intercourse. If we want an example of a mutilation which is not required by nature, we have one in the circumcision of numerous generations of various nations in whom the prepuce is nevertheless as a rule present again and again, though they are the descendants of circumcised ancestors. We have other examples in the crippled feet of Chinese women, in the artificial deformities of the skull, which have to be produced anew in every fresh generation. These examples are the more important as they refer to young individuals, and because it is said that the tendency to transmit hereditarily acquired conditions is especially great in young people and that it gradually diminishes as age advances.

Does this apply also to the mutilation of internal vital organs? Only very little is known on this point. *Massoin*¹ has reported a case of artificially produced atrophy of the spleen which was hereditarily transmitted, but it is principally the experiments of *Brown-Séquard* and of his successors on the hereditary transmission of artificially produced epilepsy which are frequently quoted as evidence. By certain operative injuries to the nervous system (injury to the sciatic nerve, or uni-lateral section of the spinal cord) *Brown-Séquard* has succeeded in making rabbits epileptic and in observing the same conditions in their non-operated offspring; in connection with these experiments it was noticed that the operated females were more suitable for hereditary transmission than the males. *Westphal*

¹Bulletin de l'acad. roy. de méd. de Belgique. XIV, 772, 1880.

has obtained similar results by injuries to the brain, and even by blows on the head; other experimenters, however, have not been so successful as they either did not notice any alterations at all in the offspring¹ or they did not see epilepsy exclusively. Thus *Obersteiner* saw among 32 young rabbits descended from artificially epileptic parents only 2 epileptics and, in 17, weakness, paresis, neuro-paralytic eye-affections, in short, all sorts of nervous disorders, therefore a well-marked polymorphous heredity, that is a heredity transmission not of a disease, but of a nervous degeneration, of a predisposition. The last word has not yet been spoken on this subject, but I think it must be recognised that these experiments have at least demonstrated the possibility of a hereditary transmission of acquired injuries of the nervous system. It is only possible to explain this by supposing that the brain has permanently influenced the germ-cells. As to why females should have appeared to be more competent for the transmission than the males, this might possibly be accounted for by the circumstance that the development of the male germ-cells proceeds at a quicker and more active rate than that of the female germ-cells and that the male germ-plasma multiplies therefore more quickly and more numerous than the female. The latter may consequently perhaps be subject to greater influence, seeing that the influencing agencies are equally great in both sexes and that there are not as many female as male carriers of germ-plasma to divide the effect of those agencies.

The hereditary transmission of functional acquisitions.—If the possibility of a hereditary transmission of traumatically acquired new qualities cannot be excluded, there is even more reason to admit theoretically that such a transmission exists with respect to changes in different parts brought about by use or non-use. It is perhaps necessary to distinguish here also between important and unimportant parts, between extremities, outer coverings and internal organs, although it has been maintained, for instance, that the kneecalcosities present in camels employed as beasts of burden are hereditary while they are entirely absent in the animals living

¹*Sommer*, Ziegler's Beitr. 27 Bd. 1900.

in a wild state. The productiveness of the udder in cows has been considerably increased by artificial training; on the other hand there are gynæcologists who incline to the opinion that the breasts in women have undergone considerable hereditary degeneration on account of the growing practice not to demand any service from them.

Breeders of animals believe also that intellectual faculties acquired by practice are hereditarily transmissible. As regards man experience has shown that most highly gifted and talented individuals may spring from circles with very limited mental activity, and vice-versa, that very often the nearest descendants of most clever men whose minds were constantly employed hardly reach mediocrity. But these are perhaps exceptions, and we may take it that as a rule non-use of a faculty leads to its hereditary diminution and use to its hereditary increase.

Hereditary transmission of chemical changes.

—Above all we are justified in thinking of a hereditary transmission of acquired conditions when chemical changes come into consideration, due perhaps to the absence of, or an alteration in, a so-called internal secretion. It was hoped that the knowledge recently gained with regard to immunisation would also lead to an advancement of the doctrine of heredity and some observers have already spoken of a hereditary transmission of an artificially produced immunity. There can be no doubt about this, since experiments as well as observations in man have proved beyond doubt that there exists a congenital intra-uterine immunity, but we know that this is not evidence of the hereditary transmission of acquired conditions, and that it might be nothing more than a purely placental transference of the immunising substances. Proofs of a hereditary transmission of the immunity could only be forthcoming if it were possible to show that an acquired immunity can be transmitted to the offspring through the semen. Unfortunately this does not appear to be the case, certainly not as regards abrin and ricin immunity so that congenital immunity where it does occur does not rest upon heredity but, if one may say so, upon a placental intoxication.

But even if it were possible to prove that a transmission

of an acquired immunity does take place occasionally from parents to offspring through the germ-cells; if it should turn out to be correct that a natural immunity, as f. i. that of ancient civilised nations towards some infectious diseases, is due to an acquired immunity being transmitted hereditarily, it would still be necessary, in order to look upon it as an example of hereditary transmission of directly acquired qualities, to demonstrate that it is not a primary variation of the germ-plasma, but a secondary and subordinate one equal in its effect to the variation in the soma. In the latter case it would only be an indirect germinative acquisition which must be judged quite differently.

The same doubt arises in all those cases in which a physical anomaly suddenly appears in a family or in which predispositions to disease of any kind show themselves. Be it hexadactylism, or hypospadias, or hæmophilia, or gout, diabetes or anything else, proof will hardly be forthcoming that a primary variation in the germ-plasma is not accountable for the first case, and if it is so, there is nothing extraordinary in the variation being hereditary—but it is not in such a case a hereditary transmission of acquired conditions in the sense in which the term is generally taken.

SUMMARY.—In summing up the theoretical foundations of heredity they may be recapitulated in brief as follows: Qualities which are derived from the continuity of the germ-plasma are inherited and hereditarily transmissible qualities; what has arisen through primary variation of the germ-plasma and appeared for the first time in the offspring is acquired indirectly and can also be hereditarily transmitted; that which produces a secondary but adequate variation in the germ-plasma after having appeared first in the soma of the same generation is acquired and hereditarily transmissible, but acquired conditions of the soma which do not produce an adequate variation in the germ-plasma cannot possibly be so transmitted. This seems to apply to all mutilations of external and superficial parts.

Potency of heredity.—If we compare to one another the different cases which exhibit a hereditary transmission of particular qualities, a series of special phenomena appear both

in normal and abnormal heredity, which, though it may not be justifiable or advisable to designate as laws, manifest very often a certain regularity and are therefore worthy of a brief consideration.

Although theoretically speaking the hereditary tendency of the male and female germ-cells is exactly the same, it is well known that heredity as a whole as well as with regard to single parts of the body is very variable not only in respect of the two sexes but also in respect of different parts of the body in the same sex. As regards both normal and pathologic physical peculiarities, it is sometimes the paternal influence which predominates and sometimes the maternal, so that the children are constitutionally sometimes more like the father, and at other times more like the mother. In some cases the paternal heredity seems to predominate at one period of the child's life and the maternal at another, and frequently such a mingling of the two takes place that a similarity *f. i.* in the facial features in either direction is altogether absent, and something totally new and different makes its appearance. That certain parts of the body may reveal a striking hereditary character is evidenced by the noses of the Bourbons and the lips of the Hapsburgs whose male scions have transmitted their facial peculiarities to their descendants though married to women of most varied descent. Pathological conditions equally show very different tenacity; some can be made to disappear only very slowly, others, *f. i.* certain mental degenerative symptoms, can be counteracted more quickly and successfully by the introduction of non-predisposed germ-cells.

Crossed heredity.—The descendants of opposite sex may resemble each other completely or they may be totally unlike changing according to sex or even in the same sex; sometimes there is a crossed heredity, that is, the sons resemble more the mother and the daughters more the father. There is no fixed law whatever in the matter although there may be certain general differences as regards the quality of the heredity on the part of the male and female ancestors respectively as suggested especially by *Orschansky*.¹ This observer says that

¹*Orschansky*, l. p. c., page 345.

each of the two procreators plays in heredity a special definite part; the variability or individuality is influenced by the paternal element, whereas the maternal tends to maintain the average type. The mother transmits a minimum of pathologic heredity, she offers energetic resistance to the disease-producing influence of the father and finally transforms a severe hereditary predisposition into one of a less threatening type.

Homosexual heredity.—That the sex as such is not without significance in the hereditary transmission of predispositions to disease, that the general sexual tendency has some definite and influencing bearing on the pathologic proclivity, in other words, that heredity does not depend only on the parents but also on the offspring themselves, and especially on their sex, this is clearly seen in the homosexual character which is distinctly apparent in some pathological hereditary conditions. Thus there have been hæmophilic families in which only the male members but none of the female showed the hereditary affection. Nevertheless the important observation has been made, in hæmophilia and in other anomalies as well, that although the women did not present any traces of the inherited peculiarity in themselves, they were yet capable of transmitting the same to their male descendants.

Latent heredity.—That is a case of so-called latent heredity which proves, particularly as regards hæmophilia, that it is not the disease which is inherited, but a predisposition to it, from which the disease itself need not necessarily result. For it is evident that the women must have possessed the predisposition in question considering that they were able to transmit it and that certain special circumstances obviously connected with the female sex, prevented it from developing into disease.

Collateral heredity.—Latent heredity plays a part also in the so-called collateral heredity, in which normal or pathological conditions were present not in the direct ascendants but in collateral ones, that is, uncles, aunts, etc. Of course these collateral ascendants could not possibly transmit anything, and for this reason the term collateral heredity does not seem very appropriate. The explanation is probably that a common ancestor was the transmitter of the peculiarity in question, and

that among the offspring affected with the latter one or two did not exhibit it manifestly; that the parent male or female of a particular descendant was one of those who inherited the peculiarity latently, and that he or she was able to transmit it to his or her offspring directly, or even through one or two generations also latently in whom it reappeared in full strength. But even in latent heredity it is not absolutely necessary that there should be a hereditary transmission of a particular peculiarity, as the case might be nothing but the result of external circumstances. Thus *Delage*¹ has expressed the opinion that there is no latent heredity as regards special parts of the body, but that the ovum has a definite physico-chemical composition which permits it under favourable circumstances to develop within certain physiological limits; it would then depend entirely on external circumstances whether that development inclines to the one limit or the other; with regard to the nose, f. i., it might be the same limit in the grandfather and the grandson and the other limit in the case of the father. It would therefore not be correct to speak of a latent hereditary transmission of the grandfather's nose to the grandson, as the same external circumstances may have produced the same result. Such an explanation however is not admissible in the case of pathologic conditions which have been latently inherited just because they are not phenomena coming within physiological limits but are altogether outside the range of physiological normality.

Reaction, Atavism.—In these cases of latent hereditary transmission there is a so-called return to ancestral conditions; if the ancestors in question were a few generations removed we speak of atavism. But as it is not only a return to more or less remote ancestral conditions which is assumed but also, especially as an explanation of animal-like formations (theromorphism), to species which are very far removed in the phylogenetic genealogical tree, it is necessary to distinguish clearly between family atavism and phylogenetic atavism. It is the latter which has been advanced as an explanation of all kinds of pathological conditions (polydactylism, polymastia, microcephalism, etc.) of which it has been said that they have arisen through latent

¹l. p. c.

heredity. As to some of the conditions pertaining to this class however, their purely pathological character has been demonstrated; with regard to others it is sufficient to say that they are due to an arrested development, since even animal-like formations (theromorphism) may easily be caused by it, and since ontogeny is to a certain extent a recapitulation of phylogeny. It might therefore be permissible to speak of an ontogenetic atavism. Nevertheless some biologists have even in recent days spoken approvingly of phylogenetic atavism and phylogenetic latent heredity. Special stress has been laid on the atavistic character of certain so-called degenerative phenomena in hereditary insanity in which a secondary origin has been thought of as a consequence of the cessation of the altruistic activity. The primary disorder need not therefore be also an atavistic one; *Lombroso's* idea of the "homo delinquens" as a sign of return to our wild ancestors has found no supporters.

Corresponding heredity.—It has already been mentioned that inherited predispositions may not mature fully before the period of extra-uterine development, so that they are not complete at birth and only show themselves at a later period of life. This condition has been called corresponding heredity, if the predisposition appears in several generations at the same time of life.

Homoeo-hetero-polymorphous heredity.—Heredity may be homomorphous or heteromorphous; in the former kind an equal condition appears in the offspring (hexadactylism, hypospadias, tendency to hæmophilia, gout, etc.) or something else, perhaps something in many ways different. In such case we speak of a polymorphous heredity, an example of which we often see plainly in mental diseases of a hereditary nature. Nevertheless the conditions are all of the same class, though quite different disturbances affecting different parts of the body have been associated and a far-reaching transformism has been assumed. Thus *Orschansky*¹ quotes as an example of transformation of inherited forms of disease the observation that the children of fathers suffering from diseases of the chest are frequently subject to nervous or mental diseases. He says:

¹l. p. c., p. 270.

"For this reason, the transformation of that form of disease from which the parents suffered appears in a new pathological variation as a main peculiarity, almost as a law for the whole range of pathological heredity. Functional diseases of the mother are frequently transformed into a more constant and more severe organic disease in the son, and an organic disease of the father is no less often transformed into less serious functional disorders in the daughter." It is always a risky thing to lay down laws with regard to normal or pathological heredity, and many a law thus laid down has been afterwards demolished by the facts, but the transformistic theory is not without its supporting realities. Heredity need not confine itself to special parts of the body. It may cause a deficiency in the constitution as a whole. It is possible for a general dystrophy or degeneration to be present and to be inherited. What will emerge from that general unfavourable predisposition, where disease will make its appearance, of what form that disease will be, all this depends, like in the polymorphous heredity of insanity, entirely upon external circumstances. For here also not a disease has been inherited, but only a general inclination to disease.

The literature on the points discussed in this article is enormous and it is impossible to give complete references here. I mention therefore only a few recent works in which the literature on the subject will also be found.

Literature.

E. Roth, Die Tatsachen der Vererbung, 2. Aufl. Berlin 1885.

F. Rohde, Ueb. d. gegenwärtigen Stand der Frage nach der Entstehung und Vererbung individueller Eigenschaften und Krankheiten. Jena 1894.

P. Le Gendre, L'hérédité et la pathologie génér. in *Traité de Pathol. génér.*, publié par Ch. Bouchard, T. I. Paris 1895.

Lubarsch, *Ergebn. d. allg. Path.* I, S. 427.

A. Dietrich, Die Bedeutung der Vererbung für d. Pathologie. Tübingen 1902. (Mit Literaturzusammenstellung.)

Wassermann, *Erbh. Uebertragung d. Infektionskrankheiten. Hbd. d. pathogen. Mikroorg.* I, 380, 1902.

Yves Delage, L'hérédité et les grands problèmes de la biologie générale, 2. Ed. Paris 1903. (Mit eingehender Literaturberücksichtigung.)

Orschansky, Die Vererbung im gesunden und krankhaften Zustande. Stuttgart 1903.

Schwalbe, D. Problem d. Vererbung in d. Pathologie. Münch. med. Woch. 1903.

IV

Consanguinity in Marriage and its Effects on the Offspring

IV.

CONSANGUINITY IN MARRIAGE AND ITS EFFECTS ON THE OFFSPRING.

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Introduction.—The question as to the injuriousness of marriage between blood-relations has already produced a very extensive literature. By far the greater number of authors incline to the opinion that such marriages are harmful and seek to prove its correctness by the frequent occurrence of predispositions to disease and of disease proper among the descendants of blood-relations. Others again attempt to establish as probable exactly the opposite of this, or they make so many reservations that the absence of outside blood as the exclusive cause of organic degeneration in the offspring is divested of all special significance. Nothing would be easier than to quote here a large number of contrasting views, and the most careful observers agree in declaring the question as by no means finally solved.

The great divergence in our present scientific views of the injuriousness of consanguinity in marriage depends probably on various causes. In the first instance the question is a difficult and complicated one. It has never been impartially examined into whether marriage between blood-relations does not present also at least certain one-sided advantages to the offspring, relating for example to mental development, such as we have reason to expect in accordance with the laws of heredity. Generally speaking neither question nor proofs have been advanced with sufficient regard to the facts and laws of heredity though not even in this way do we always arrive at the same result.

Influence of heredity.—Consanguinity is first of all capable of producing an easily imaginable augmentation in the effect of heredity. (Summation of the predispositions by potential, combined heredity.) And it is further conceivable at least, that it may form per se, even without any manifest hereditary predisposition and in the case of apparently perfect procreators the cause of certain diseases. But in such a case, even if we do not exactly adhere to *Weissmann's* strict theory of heredity and agree with the less rigorous view of *Orth*, new qualities, of whichever kind they may be, can only be inherited through a series of generations if influences are really exercised through the consanguinity upon the germ-plasma directly or in conjunction with the whole soma, thus producing degenerate germ-variations which are hereditarily transmitted through subsequent generations. There are however at the most only very few such external influences upon the germ-plasma known to pathology (suitable examples might be found perhaps in the predispositions to disease, and in the injury to the germ-cells caused by alcohol). But where no degeneration of the germ takes place there is no hereditary transmission to subsequent generations, and nothing of consequence occurs. By observing strictly the laws of heredity one is never certain when examining statistically into one and the same peculiarity (good or bad) of a number of people descending from a consanguineous marriage that predisposition through heredity in the narrower sense can be excluded entirely. Because from the laws of heredity the possibility arises that two similar predispositions which are not on account of their slight intensity noticeable in the parents individually, combine and obtain through this combination such a force in the offspring that a definite characteristic is imparted to the latter. The qualities arising by means of such combination-processes in the germs are not inherited as such, as they never existed in this form in the ancestors; but as they consist of distinguishing features of the parental germ-cells they must have been transmitted from the ancestors to their descendants; in such a case the appearance of new qualities in the children is only an apparent one. It is even conceivable that a certain peculiarity has not come to light in the consan-

guineous parents because it was suppressed by other predominant characteristics; the latter being less prominent in the children the parental peculiarity not observable in the parents becomes strikingly so in the offspring. The question may therefore be simplified and the probability of obtaining decisive results from investigation will accordingly be the greater, if we begin by taking into consideration only the augmentation of the effects of heredity through consanguinity, and disregarding, on account of its being outside the domain of ordinary heredity, the organic degeneration in the descendants supposed to result exclusively from the absence of foreign blood.

Moreover the examination into the consequences of consanguineous marriages has hitherto been frequently conducted for certain purposes, or only partially, from limited and one-sided standpoints, on the basis of restricted statistics or historical observations of the civilisation of self-contained nations and castes and of the experiences of agriculturists and breeders. It is therefore not surprising that as soon as the results thus obtained were generalised and made to apply to all conditions without exception, mistakes often arose. But the question as to the nature and consequences of consanguinity can only be solved in a manner embracing all the points of view hitherto considered separately, and that not exclusively with regard to one particular species of organism, say, man alone. This must be done by comparative investigations comprising the whole organic world. A well-directed combination of all the standpoints from which the problem has hitherto been studied is accomplishable, and the widest possible survey obtainable by considering the marriage of blood-relations as a special case of in-and-in-breeding.

In-and-in-breeding (Endogamy).—In opposition to the natural selection as it proceeds in nature by means of the struggle for existence we call in-and-in-breeding (or endogamy)—the further propagation among themselves of the cross-products of various races. In this way it is possible with certainty to perpetuate in the course of a few generations qualities produced in the cross-breed. The general admixture in one and the same race may, according to *Reibmayr*, be called “far

in-and-in-breeding"; that inside of a small circle of individuals of the same race "near in-and-in-breeding." In-and-in-breeding produces refinement; but morbid characteristics common to both parents are naturally also capable by (near) in-and-in-breeding of aggravation and accumulation. The selection from all the qualities by the in-and-in-breeding depends therefore probably also only on an augmentation of the effect of heredity. Consanguineous breeding is entirely subject to in-and-in-breeding, for it is evident that the fixation of certain characteristics is effected much more quickly by the pairing of demonstrable blood-relations. The stigma of incest which is accountable for a great deal of the existing prejudice against consanguineous marriages therefore falls to the ground.

Blood-relationship and its degrees.—Relationship (blood-relationship) is according to the ideas prevalent among civilised nations with respect to family, the connection existing between several persons on the basis of procreation or descent and therefore on that of community of "blood." The term "blood" means in this connection the sum of all the peculiar characteristics and faculties inherent in all these persons (the breed), but especially all the in-and-in-breeding phenomena. The expression "direct line" means the relationship of those persons of whom one descends from the other. Where individuals are not related in a direct line but are descendants of the same third person we speak of "collateral relationship." Blood-relations born from the same parents are full brothers and sisters; where they have only one parent in common, they are half-brothers or half-sisters, that is, consanguineous where the common parent is the father, and uterine where the common parent is the mother. "Distant" relations begin according to the "*Sachsenspiegel*" (a mediæval law-book) with the children of brothers and sisters. The collateral lines are either "like" when each of the lines coming into consideration has the same number of removes (cousins *f. i.* are said to be related in a like line) or "unlike" (as *f. i.* the relationship between uncle and nephew). The nearness of relationship is determined by the number of removes present between two persons. According to Roman law there are as many removes between two relatives

as there are births between them. The German Civil Code (§ 1589) has adopted the same principle. It declares father and son as related to each other in the first degree of the direct line, grandfather and grandchild in the second degree of the direct line, brother and sister in the second degree of the collateral line, and uncle and nephew in the third degree of the collateral line. The canonical reckoning of collateral relationship takes into consideration the distance from the common ancestor; canon-law takes therefore only one line, but always the longer one, that is the procreations as far as the common founder. According to canon-law, brother and sister are related in the first degree, uncle and nephew in the second. There may also be "double relationship" both in the direct and in the lateral line. In the first case it may arise by the descent of one person from another through two lines of generation (f. i. great-grandfather and great-grandchild, where the latter springs from the union of two cousins). Double relationship is present in the lateral line where two persons are descended from a common third through more than two lines of generation or from two common ancestors (mothers).

This is the place to mention two propositions discussed by *Lorenz*. According to him, every individual has two parents but not everybody has 4 grandparents and 8 great-grandparents, and very few people indeed are able to supply any information about their 16 ancestors and 32 great-ancestors. With regard to these there are only pedigrees which prove that in the upper lines of ancestors the same persons appear several times as the ancestors of one and the same descendant. This happens to a greater extent wherever marriages occur among near relatives but also much more than is generally assumed even among the descendants of different families. The proportion of the number of ancestors theoretically to be expected to the number actually present expresses the numerical loss of ancestors. In the uppermost ancestral lines we ought to possess an extraordinarily large number of ancestors, but in reality the number of ancestors in the uppermost lines is apparently a very small one indeed (we are hardly all descendants of Adam and Eve but spring presumably from a limited number of ancestors) and the

loss in ancestors is therefore an immense one. As it is at present generally the case, the number of ancestors of any one descendant is much too small, because the number of people who really do cross is on account of such circumstances as race, nationality, religion, domiciliation, difference of social position, etc., etc., comparatively a very limited one. The greatest possible increase in the number of ancestors is caused by racial admixture. Everything depends therefore on in-and-in-breeding. An exact definition of the term "in-and-in-breeding" is really possible only on the basis of a mathematical calculation of the loss in ancestors.

The complemental value of the loss in ancestors is the sum of heredity. To the descendants of a marriage between cousins the loss in ancestors is $2/8$; the sum of heredity is therefore $6/8$. This means that the children of such a marriage have only 6 great-grandparents instead of 8, and that they consequently inherit their qualities from 6 such great-grandparents only. But the sum of heredity of each of the 8 ancestors is to be reckoned as $1/8$. According to *Peipers* this method of calculation causes difficulties only where there are deviations within the line-succession, that is, where a pair of ancestors appears in different lines. The loss in ancestors to the descendants of a marriage between uncle and niece, for instance, is reckoned to be equal to that of cousins, although this seems incongruous. *Peipers* confines himself to giving a short account of how the value of the sum of heredity is to be calculated from genealogical points of view:

Father and daughter . . .	Sum of heredity = $1/2$
Brother and sister . . .	" " " = $2/4$
Uncle and niece	" " " = $1/4$
Double cousins	" " " = $4/8$
Cousins	" " " = $6/8$
Second cousins	" " " = $14/16$

The designation in degrees hitherto adopted is not of much use, because, as we have seen, most variable methods of calculation have been and can be applied. In Germany there are two legal "computations," the juridic-Roman and the canonic.

Incest.—We have already defined the pairing of demonstrable blood-relations as consanguineous breeding. This consanguineous breeding becomes incestuous breeding if parents pair with their children or grandchildren, brothers with sisters, or grandchildren with one another. Where the relationship is not too close we speak of family-breeding (marriage between relatives).

Prohibition of marriage between blood-relations.—It may be said that the prohibition of consanguineous marriages is the rule not only among civilised but also among uncivilised nations. Respecting the latter two customs connected with marriage and dating from ancient barbarian times are quoted by those opposed to consanguinity, namely exogamy and wife-capture (Australia, northern races [*O. Magnus*]), the prohibition among the Indian Brahmins to marry women belonging to their own tribes, the rape of the Sabbinian women, the abduction of Shilo's daughters by Benjamin's men spoken of in the Bible, the preservation of some "form of wife-capture" by various nations of all kinds of races, the prohibition to marry a person bearing the same family-name existing among the Chinese, in the highlands of Scotland and among the peoples in the Indian Archipelago, etc., severe punishment of incest. (Buginese, Pasemakers.)

It would be however very difficult to prove that exogamy f. i. was nothing else but a reform-measure intended to put an end to marriages between blood-relations when it was found that they have injurious consequences (*Morgan, Main, Schiller-Titz*). It probably originated mainly as a result of the oldest condition of society and of the family (communal marriage, polyandry, marriage with the brother's widow, scarcity of women among some tribes, etc.). The matriarchate associated with such a primitive family-system would even frustrate the intention to eliminate consanguineous marriages; for half-brothers and half-sisters on the father's side would be able to marry each other, being of different tribes. As a matter of fact this kind of marriage is seen in different nations, even in such which have already discarded exogamy or restricted it to portions of tribes, as f. i. among the Howas (*Schiller-Titz*):

brothers and sisters may marry each other, but they must not have the same mother.

But it would mean going too far were we to deny altogether that an empirically gained conviction of the injuriousness of consanguineous marriages played here any part. The Arabs, f. i. as *Schiller-Titz* shows, are perfectly familiar with this theory of injuriousness. A saying of the Haditt—the sacred tradition of the Arabs—runs: “Marry from among strangers, so that thou dost not beget a weak offspring.” Later law-books also give expression to this view, f. i. that of *Badjuri*, the commentator of the *Ibn-Quasim*. He says: “Whoever wishes to obtain a noble breed must marry from a foreign country, just as one will obtain good fruit from a branch grafted into a foreign trunk.” Similarly marriage with a “bint-amm” (the daughter of an uncle on the father’s side) is also exhorted against.

The main reason of the laws enacted by civilised nations against marriage between nearest relatives is probably also not to be found every time in the intention to prevent a degeneration of the species. Legislators, œcumenical councils, etc., only very rarely express themselves directly in that sense. Pope *Gregory I.* (ob. 605) writes for instance to the Benedictine monk *Augustinus* who was sent out to convert the Anglo-Saxons: “A secular law of the Roman State permits marriage between the son and daughter of a brother and sister. But experience teaches that the offspring of such marriages cannot thrive.” This opinion of the injuriousness of consanguineous marriages is expressed even more distinctly in the *Capitularia regum francorum*. There it is said that from marriages between relatives spring blind children and cripples, lame and blear-eyed, or offspring affected with other similar infirmities. Nor have the laws of civilised States which have from times immemorial endeavoured to restrict marriages between blood-relations proceeded exclusively from anti-sanguinistic motives. This is seen, to begin with, in the great difference of these restrictions as regards the degree of blood-relationship. Moreover, there is sufficient direct testimony to prove that these laws have principally been passed for the purpose of preventing, by the sharp

prohibition of marriage between blood-relations, prostitution among families, the accumulation of too large fortunes by a limited number of people, etc., etc.

Let us now examine into these laws regarding consanguineous marriages which have existed among the highest civilised nations in history and are at present in force in the most important European States. Relationship appears here as a relative impediment to marriage.

Moses prohibited marriage between blood-relations of the nearest degrees (with parents, grandchildren, full and half-sisters, sisters of father or mother) but was tolerant with regard to marriages between cousins and between uncle and niece. The Mosaic law demands categorically that daughters shall marry only from among the family to which they belong; this was an indirect incitement to marriage between blood-relations. Among the Spartans marriage between relatives in the direct line was prohibited. In Athens the marriage of near relations was in certain definite cases not permitted; on the other hand consanguineous marriage became a duty when a citizen left only an heiress, as the latter was in such a case compelled to marry the nearest of her relatives so that the fortune should remain in the family. The Roman law contained prohibitions of marriage between ascendants and descendants, between persons standing in the "*respectus parentale*" (that is, the relation between uncle or aunt on the one side and nephew or niece on the other), and between brothers and sisters.

Canon-law introduced severer regulations and prohibited every marriage in the direct line between ascendants and descendants, and in the collateral line not only marriages between brothers and sister and between cousins, but even those between removed cousins (*sobrini*) up to the 6th degree, inclusive, of relationship according to Roman computation.

Since the eighth century the Church has endeavoured to restrict still more marriages between blood-relations and prohibited the same gradually up to the 7th degree of the Germanic calculation of relationship, which differs from the Roman method in so far as it does not like the latter include the neces-

sary number of births for the creation of the relationship but only the births of one side, and if the two are not alike those of the longer side up to the common ancestor. If therefore two persons are according to the canon-law reckoning of the degree of relationship (*computatio canonica*, or really *computatio Germanica*) related to one another in the 7th degree, they are according to Roman-law reckoning (*computatio civilis*) related in the 14th degree. Canon-law thus permitted marriage from the 14th degree of Roman computation. *Innocent III.*, however, restricted again (1215) the prohibitions up to the 4th degree of canonical computation, and this law is at the present day in force in the Catholic Church; but dispensation is (easily) obtained for the 3d and 4th degrees, and even for the 2d. According to Protestant Church-law the direct line is in all cases an annihilating, indispensable and public impediment to marriage, the collateral line is so in the first degree, that is with respect to brothers and sisters. There also used to be a dispensable impediment to marriage in the case of "*respectus parentelae*."

The Koran prohibits marriages between relations.

The German Imperial Code (*Deutsches Reichsgesetz*) of 1875 recognises the following impediments to marriage: relationship in the ascending and descending line, the relationship between full and half brothers and sisters. Marriages between cousins, between uncle and niece, and between aunt and nephew are by German law distinctly permitted. In Russia the secular legislation is like that of Canon-law (previous to *Innocent III.*) and it forbids marriage between blood-relations up to the 7th degree. In Switzerland marriages between cousins, uncle and niece, and aunt and nephew are distinctly prohibited—that is, without dispensation. In Austria also these marriages are prohibited, but among the Jewish subjects of that country marriage between cousins is allowed. In England, France, Italy, Holland and Roumania marriages between relatives of the 3d degree (uncle and niece, aunt and nephew) are either prohibited altogether or permitted only by dispensation, but those between relatives of the 4th degree (cousins) are permitted.

Modern legislations therefore materially differ on the

point; the two extremes are formed by the German and the Russian.

Historical and ethnographical remarks on endogamy and on marriage between relations (brothers and sisters).—In the attempt to grasp the problem of the origin of human civilisation and to discover historical foundations, too much influence has been attributed to one-sided definite factors. Whereas f. i. *Buckle* makes it appear that the fate of the human race is dependent entirely on soil and climate, *A. Reibmayr* and *Houston-Chamberlain* emphasize exclusively the effect of in-breeding and of race-mixture. There are doubtless also other external influences and inner forces concerned in the matter which have perhaps hitherto received no consideration. The investigation into the consequences of consanguineous marriages cannot therefore expect to gain overmuch from mere historical retrospects and analogies. Historical evidence is in this respect far too different from scientific proofs inasmuch as the former does occasionally, at least in such questions as those concerning us here, allow a little too much latitude to subjective tendency and the supplementing phantasy. But with regard to the enormous extent of our problem and indirectly also with regard to its importance we can learn something from historical observations. The more so, as statistics especially are not of any more decisive benefit to our subject than anthropological and ethnographical considerations which, it must be admitted, are probably of greater consequence than purely historical conclusions.

Where no in-breeding is adopted no distinct types at all of animal or human races are produced; and absolutely noble races can only be preserved by incessant breed-selection. The consequence of long-continued near in-breeding is a growing tendency to degeneration. The bad influences become apparent as a rule very slowly and only in the course of several generations; hence why they frequently escape observation in a single generation.

Historically it appears that man has always practised in-and-in-breeding, unless special causes making the struggle for existence vastly severer (over-population, geological disturbances,

etc.) produced temporarily a complete interruption. It would even seem that civilisation has constantly kept pace with the satisfaction of the desire to breed-in-and-in prevalent among the hordes and nations which made their mark in history, with the separation of in-bred castes and the avoidance of extensive crossing. Thus there arise not only physical characteristics but also important mental qualities which are the basis of pre-dominance. Periods of more intensive admixture generally exhibit want of distinguishing features. (*Reibmayr*.) On the other hand pure and prolonged preservation of an absolutely strict in-breeding principle assists in producing a crystallisation of the main racial peculiarities and prevents further progress. A complete suppression of the natural selection leads finally, especially in the principal castes, to bodily and mental deterioration, that is, to an hereditary disturbance of the correlation between the single organs of the body and of the mind.

Just as great progress in the civilisation of any single nation is apparently impossible without a close in-breeding, so mankind in general would not make any marked advance without the inter-mixture of civilised nations with others physically superior to them though culturally on a lower level. The effect of such an intermixture is in the first instance the conservation and regeneration of the physical strength of the races, and in the second a transformation of mental faculties. Where two distinct races intermix the result is, to begin with, something heterogeneous. Some original characteristics however are not altered but transmitted to the offspring; and the tendency of the latter to revert to parental forms lasts for some time. The formation of extreme qualities is also delayed. But after having conquered this reversion, and after a short retrogression in the state of civilisation later generations attain higher degrees of culture comparatively much more rapidly.

The impartial observer will therefore direct his attention to the "optimum" of in-breeding; beginning with the possibility of procreation under equal pairing the chart reaches a certain height in the excellence of the offspring which shows a certain similarity to that of the procreators, and then sinks towards the other extreme which renders procreation impossible (maxi-

mal similarity of the procreators, equality of generations). The question as to the latitude of the "optimum" cannot at present be definitely answered. The conditions are probably not the same in man as in animals; in plants they are certainly different.

The classical endogamous nations of ancient times are above all the Egyptians, the Jews, and the Aryan Indians. The whole national State and legislation of the Jews *f. i.* were based upon the principle of in-and-in-breeding. The descendants of the tribe of Levi became the leading caste. But as the priests had no share in the inheritance of Israel, they were not as completely separated from the people as other ruling castes which on account of the riches they acquired were a class absolutely apart from others. The first-born from among the people belonged to the Lord and had to be redeemed; they seem therefore to have been destined to make up the full number of the Levites in case of the diminution of the latter. Provision was thus wisely made for a necessary selection and for fresh blood. The duty of Israel to keep themselves holy by strong seclusion from everything pagan became more and more a dogma. The exile, like the sojourn in Egypt, was a practical school of strict separateness. The laws relating to in-and-in-breeding underwent codification after the return from the Babylonian captivity (544 B. C.). The community assumed the obligation to prevent all mixed marriages with individuals not belonging to it. Women and children belonging to foreign tribes were turned away. That Judaism is still existing at the present day is partly due to the strict retention of the in-breeding principle by the later Pharisees and their successors the Rabbis. With such a comparatively small nation it almost follows as a consequence that in the post-exile period and especially afterwards during the dispersion all the Jews in certain places must have been related to each other and consanguineous marriages must have been quite common. Thus Tobit advises his son Tobias (at the time of the Maccabæans?) to take unto himself

a wife from among his relations, according to Jewish custom. But it was not permitted that a man should marry his mother, step-mother, sister or step-sister. After the final dispersion of the Jews there were only two countries in which they could intermix to a relatively greater extent, namely in Mahomedan Spain and in Poland. In Spain this intermixing took place with kindred semitic or half-semitic races. *Reibmayr* is inclined to attribute the circumstance that the Sephardim who sprang from this intermixture are a physically good-looking and mentally capable race, to the many marriages entered into with Arabs, etc. On the other hand he believes that the inclination of the Polish Jews to encourage intermixing must have been very small (under King Kasimir the Great the Jews were relatively well-off), or else the Ashkenazim would in spite of an eventual mental retrogression have become at least physically stronger and finer-looking. This evidence is however by no means exhaustive. The Sephardim have had since the dispersion a happier period than any other portion of the Jews, and this cannot have been without some effect upon their race; whereas in the case of the Polish Jews not only in-breeding, but poverty and its consequences must have played a very considerable and fateful part in their degeneration. Upon the whole it may be said that the Jewish nation which has on account of its hard struggle for existence been constantly subject to a certain weeding-out process, and whose leading caste has not kept absolutely aloof from the bulk of the people, has, during its course of a history extending over more than 100 generations, received from its in-and-in-breeding policy more good than harm: at the worst it may be said to have become a markedly fixed type with a striking hereditary intensity. The wonder really is that the Jewish nation exists yet at all.

In more recent and modern times the value of pure in-breeding may be judged from the English and the Japanese. On account of its insular position England is

cut off from the rest of the world. The last serious invasion took place 800 years ago; since then only a few thousand Netherlanders and Huguenots (therefore kindred blood) have been added, and thus the strongest present-day race in the world has sprung up. Perhaps the same thing has happened in Japan where there was also at first a good intermixture; afterwards insular seclusion was an important element in the formation of the race. The Japanese are the most important nation, at least among the Mongolians.

Instructive in this connection is perhaps also *Chamberlain's* reference to the Slavs. Qualified historians do not attribute to them, in spite of their great ability, any creative faculty or executive perseverance. The cause is supposed to lie in the fact that the majority of this large race has through intermixture with another race lost the physical characteristics of their ancestors (who were identical with the old Germans), and at the same time the mental qualities as well. The decline of prominent racial peculiarities through intermixture is still more apparent in Rome since Sulla and Marius, in the South American States (Peru), etc.

Peipers calls attention to the fact resulting from the observations and conclusions of *Lorenz*, that there is everywhere, and especially in rural districts, a far greater amount of blood-relationship and common ancestry than one is generally inclined to admit. The bondage of former centuries did not only mean an attachment to the soil; it also compelled marriage with fellow bond-servants of the opposite sex who were subject to the same bond-master. As a consequence there arose, according to *Lorenz*, relationships of unheard-of complication and nearness just among those classes of people of whom one likes to believe that they possess an inexhaustible material of mixed blood. The inhabitants of most rural places in Europe are related among themselves a hundred and a thousand times. .

But those who lay particular stress on the dangers of in-and-in-breeding are also not short of examples which seem to prove that the unconscious popular

instinct interferes here for purposes of correction. Such an example is furnished by the Iroquois of North America. These Indians are divided in a number of clans, which represent smaller nations of the entire nation. Each of these clans elects its own chieftain, its members are heirs to each other, and each possesses its own symbol or totem. As regards marriage there is a fixed law. Each clan consists of many marriages. These have from times immemorial been arranged in the following way. No young man or maiden marries into his or her own clan. Marriages can under all circumstances only be entered into between members of two different clans. Each marriage means therefore an addition of fresh blood. Children owe allegiance to their mother's totem ("Maternal jurisdiction"). Father and mother remain in her clan. A similar method of totemism has (according to *Fison* and *Howitt*) also developed f. i. among the natives of Coopers Creek in South Australia.

Taking everything into consideration it would therefore appear that anthropologico-historical observations are rather inclined to prove that provided the quality of the material be good the production of noble races depends largely on the laws of breeding-in and weeding-out, and only to a small extent upon an admixture of blood, limited both as to time and method. The promiscuity desired by *Virchow*, *Ratzel* and others is in any case more dangerous than in-breeding.

History, both ancient and modern, and ethnology teach us even by some examples that nations and castes have been able to propagate themselves for longer or shorter periods by consanguineous marriages without exhibiting any gross signs of degeneration.

I will take here no notice of the incestuous unions between father and daughter, mother and son, brother and sister, spoken of in the mythologies and legends of uncivilised nations. A detailed description of these will be found in the work of *Schiller-Titz*. But it is necessary to mention that among great nations consanguineous marriages were not—and are not—only

not forbidden, but that they were—and are—entered into with predilection. The old Egyptians f. i. knew of no impediments to marriage; their Kings (especially the Ptolemæi) married not infrequently their own sisters; thus Cleopatra was the daughter of a marriage between brother and sister, the grandchild of another similar marriage and the grandchild of Berenice who was herself both niece and sister of her husband. Among the ancient Persians also, brothers and sisters used to marry each other, and so did father and daughter, mother and son. Descent from such marriage was even a condition of admission to the priesthood. The Athenians likewise permitted marriages between nearest relatives. Finally the ancient Peruvians also were in the habit of marrying their mothers, sisters and daughters. They had a law in force with regard to their ruling princes according to which the Inka was allowed to marry no one else but his own sister. This is said to have been continued during 14 generations without any signs of degeneration having been apparent in the last Inka.

These examples do not of course prove much. The non-existence of a prohibition is not synonymous with a great prevalence of incestuous marriages among the bulk of the people. But if the numerical proportion of consanguineous marriages is not ascertained exactly it is also not possible to fix their relation to the physical ability, mental development and degeneration of a people.

Schiller-Titz enumerates further among the uncivilised nations, tribes which live as yet in continued consanguinity. (The Baduwis among the Soudanese, the Bataks of Sumatra, the Arabs.) Although the small number of inhabitants in the interior villages of the Baduwis which consist of no more than 40 households have propagated themselves for 400 years by means of the closest consanguinity they are said to form a powerful race. According to *Krusemann*, no deformed or infirm are to be seen among them. The Baduwis are further distinguished by frankness and loyalty. From very early times it has been the rule with the Bataks to marry their cousins, that is daughters of an uncle from the mother's side, so that *boruni-datulang* (daughter of the mother's brother) became the

title of the betrothed and the wife. Nevertheless this nation is also said to be one of the most advanced in the Indian Archipelago. In contrast to the Malays they possess a powerful well-formed muscular system. Marriages with cousins have also been the rule with the Arabs for many centuries past.

Whereas other statements by observers who proceed from a contrary point of view contradict these customs of the Bataks and Arabs just mentioned, it seems at least certain that the peculiar constitution of the Baduwis practically enforces general blood-relationship.

Krascheninnikoff says that in Kamtschatka brothers marry their sisters, and *Cameron* reports the same with regard to the Wangoro. *Arrago* maintains that in Goam also brothers often marry their sisters; such unions are indeed considered to be most suitable and natural. Further it is known that among the Royal families of Baghirmi, Siam, Burmah, and Polynesia marriages between brothers and sisters are not uncommon. *Morgan* declares the Malay group-marriages of brothers, full and collateral, with their sisters as the most ancient relationship-system known hitherto, and one which dates from pre-historic times.

But of far greater importance as evidence are from our point of view the often-quoted observations of *A. Voisin* in the commune of Batz (Department of the lower Loire) which lies north of the mouth of the Loire on a peninsula surrounded by rocks. The 3,300 inhabitants (1865) of the same have only the most limited intercourse with the outside world. Marriages between blood-relations are very frequent among them. In 1864 there were there 46 consanguineous marriages, 5 between full nephews and nieces, 31 between children of full nephews and nieces, and 10 between nephews and nieces in the 8th Roman (fourth canonical) degree of relationship. Nevertheless the state of health in young and old up to the third generation was an excellent one, and only 2 of these 46 marriages proved sterile, the other 44 resulting in 172 healthy children.

Schiller-Titz gives similar figures from the statements of *Büchner* and *A. H. Huth* with regard to the inhabitants of

Schockland (Zuyder-Zee) and of a few fishing-villages on the Scotch coast.

Unfortunately a great deal depends in all these reports on the subjective tendency of their authors. What little regard for statistics the antagonists of consanguineous marriages sometimes exhibit may be seen f. i. from the protest of the Chief-Rabbi of France, *Isidor*, addressed to the Academy against the assertion of *Boudin* that on account of the high frequency of marriages between blood-relations among the Paris Jews the number of deaf-mutes among the latter is much higher in proportion than among Christians. *Isidor* could only find 9 deaf-mutes in the whole of his religious community of 25,000 people, and *Boudin* was able in a statistical rejoinder to prove only a portion of his assertion.

Effects of crossing and of self-fecundation in the vegetable world.—I follow here the explanation of *A. Schenk* (*Handbuch der Botanik* I. p. 7). It makes a great difference as far as the result of the pollination of plants is concerned whether the stigma is covered with pollen from the same or from another plant. In some cases the pollen of a plant has just as little effect upon its own stigmas as a similar quantity of inorganic dust. Or it may generate utriclees which do not however reach the seed-buds. Or the latter may be reached and fecundated but they only form poor and unproductive seed-corns. All such plants can be designated as self-sterile. By far the greater number of plants are certainly not self-sterile, they do bring forth even if fecundated with their own pollen a greater or smaller number of seed-grains which are capable of development; but as a rule, though not always, the fecundation with strange pollen (crossing) acts more favourably than self-fecundation. Products arising from the crossing with a foreign stock (grown under different conditions) are on an average larger, stronger and more fruitful. They offer to injurious influences or to the joint action of other plants a much greater resistance than the products of self-fecundation. And if separate plants are kept through several generations under the same conditions and propagated only by crossing between them exclusively, so that the original individual peculiarities become more

and more alike from generation to generation, the crossing of such plants between them hardly produces in the end better results than self-fecundation. But if, on the other hand, such plants which have for a long time been subject to strict in-and-in-breeding, are crossed with a fresh stock, the favourable result of the crossing is the more striking. It cannot be denied that it is possible in the vegetable kingdom to observe and to ascertain under favourable circumstances the injurious effects of (close) in-and-in-breeding, seeing that the succession of the generations is a very rapid one and that there are opportunities to accumulate a very large amount of material for observation.

It may perhaps seem presumptuous for me, who am totally ignorant of Botany, to protest against it that in the whole of animated nature the importance of intermixture has been thought to be perfectly alike. I know that cross-planting is a favourite and highly successful method of florists for obtaining large, beautiful and otherwise prominent plants; the whole flora is evidence of this. But the animal world does not contain anything universally comparable, and for this reason I do not believe that the particularly significant conclusions of in-and-in-breeding are adaptable without any restrictions in man and animals alike.

In-and-in-breeding of animals living in a wild state. Experiences of animal breeders.—Breeders of animals generally assume that it is possible by familiar breeding to fix firmly and rapidly certain qualities in any one breed. If this is however continued for too long, and especially in the form of incestuous breeding, a weakness in the constitution supervenes, a sort of over-delicacy becomes apparent in the animals. Male animals exhibit diminished sexual functions or even impotence, females show decreased fruitfulness and tendency to abort, and young animals possess less vitality. Family breeding is therefore looked upon as a successful remedy occasionally indicated. In order to guard against degeneration through incestuous breeding, breeders use regeneration, that is an intermixture with the blood of strange animals (of the same race) which possess otherwise the above-mentioned qualities of the brood.

In-and-in-breeding plays an important part also in the case of animals living in a free state, on account of their sociability, f. i. among elephants. A remarkable phenomenon among the latter as also among different other wild animals is the existence of so-called "rovers." These are single and mature male animals belonging as a rule to no particular herd, which lead a sort of bachelor-life. They form according to *Bölsche* by surprising or otherwise seducing females of other families a constant reserve army of occasional regenerators.

The morbid predispositions and pathologic conditions in man supposed to be the results in the offspring of consanguinity in marriage.—

The opponents of consanguineous human marriages base their opposition principally upon the circumstance that marriages between blood-relations even if the contracting parties appear to be normal, often remain sterile, and that the children of such marriages are often endowed with insufficient vitality.

Mantegazza, Kohl, Waitz, Devay and others have found that 10%, and even 18%, of consanguineous marriages remain sterile; on the other hand, *Darwin, Mitchell, Bourgeois, Devay, Howe, Remiss, Séquin, Dechambre, Périer*, etc. maintain that consanguineous marriages are productive of slightly more children, and it has even been asserted that they are extraordinarily prolific. This contradiction may be explained in different ways. First of all, propagation depends as I also point out elsewhere upon different circumstances, it may therefore vary considerably also in continuously in-breeding marriages. It is further possible in such marriages for the unfruitfulness to commence in later generations only, a view not taken into consideration by all authors. (Compare the statements on the subject by *Boudin* and *Balley*.) Finally the name may soon disappear, though the number of descendants of such consanguineous marriages is generally large or of normal proportions, because the male members of the family die off and the blood is maintained in the female line only. Evidence in favour of this last supposition will be found in the works of *Lorenz* and *Peipers*.

As to the vitality of the newly-born children and the

descendants of consanguineous marriages we know absolutely nothing definite.

As results of marriage between blood-relations have also been observed all kinds of degenerative phenomena, especially blindness, deaf-mutism, idiocy, insanity, polydactylism and other malformations.

Generally-hereditary eye-diseases in the narrower sense of the word, or laterally-hereditary are: Myopia (or at least a predisposition to it), astigmatism, irideremia, coloboma of the iris, coloboma of the choroid, ectopia of the lens, lamellar cataract, retinitis pigmentosa, amaurotic family idiocy (*Sachs*), hereditary optic neuritis (*Leber*), glaucoma, congenital nyctalopia (*Cutler*), colour-blindness, microphthalmus.

To this list of eye-diseases ought to be added those which may with some justification be attributed to consanguinity. Their number is, if we wish to rely upon fairly ascertained conditions, only small. *Stilling* and *Laqueur* are likewise inclined to impute to consanguinity considerable responsibility for cases of very severe myopia. Amaurotic family idiocy attacks according to *Sachs* almost exclusively Jewish families only, and is therefore perhaps to a certain extent also connected with our subject. But by far the most important condition from our point of view is the retinitis pigmentosa. Heredity may be proved in about half the number of cases of this affection of the retina. A direct transmission from parents to children is generally rare and extends as a rule over two generations only. More frequent is the collateral heredity. The affection of the retina may be complicated with idiocy, partial deafness, deaf-mutism, polydactylism. Sometimes the affections last-mentioned alternate with atrophy of the retina in the same family. And just as these complications also appear as a consequence of consanguineous marriages, so a quarter or even a third of the individuals affected with retinitis pigmentosa are said to be descended from parents who were consanguineous in various degrees. But as we shall see, the percentage of consanguineous marriages is a much smaller one, it cannot indeed be doubted that consanguinity strengthens here materially the effect of heredity. Unfortunately the material existing in the literature of the subject

is comparatively unimportant. *Schmidt* gives the following computation :

	Number of Cases	Of Con- sanguineous Origin		Number of Cases	Of Con- sanguineous Origin
Leber	66	18	Bayer	19	5
Hocquard . . .	15	4	Nolden	14	3
Höring	4	1	Derigs	27	7
Bader	60	16	Agres	25	24
Pagenstecher .	9	0	Davitson . . .	11	1
Mooren	34	9	Fano	7	1
Webster	22	3	Dorie	6	0
Hutchinson . .	23	8	Dentie	10	2
Wider	41	14	Schmidt	43	6
Siegheim . . .	73	9			
				513 Cases	131 = 25.5%

Agres calculated 22%, *Hirschberg* 25%, *Moren*, *v. Wecker*, *Jäger* 33%, *Liebreich* 40%. *Magnus* found in Breslau to every 10,000 inhabitants 8.4 blind Christians, whereas Jews showed in the same proportion 11 cases of blindness. The proportion between Jews and Christians is therefore 0.31:0.58. *Magnus* found in Jewish blind-asylums 17.6% of all cases of disease in the form of retinitis pigmentosa or retinal atrophy.

Finally cases of retinitis pigmentosa are so absolutely rare that this disease alone is hardly sufficient to justify the great literary allegation against consanguinity in marriage. It would hardly suffice to prevent about 1% of all marriages.

Boudin, the most zealous advocate of the injuriousness of consanguineous marriages, also considers them on the strength of old opinions to be mainly responsible for the more frequent congenital form of deaf-mutism. He maintains that 28.35% of all congenital deaf-mutes spring from consanguineous parents. But the statements of the different authors vary widely with regard to this percentage. *Scherbel* and *Peipers* give comprehensive compilations of the same. The numerical difference is calculated at 3.9-30.8% (*Huth*). The promised statistics of the German Imperial Board of Health are unfortunately not yet available. Existing statements greatly differing from each other do not make it seem very probable that consanguineous marriages are the most important cause of deaf-mutism. I should also like to mention that in different countries deaf-mutism is

uncommonly variable in frequency. According to *G. Mayr*, there are to every 10,000 individuals in the Argentine Confederation 42.45 male and 43.29 female deaf-mutes; in the United States of North America 4.57 male and 3.82 female; in the British Australian settlements only 3.88 male and 1.77 female; in Sweden 11.8 male and 8.77 female. But these figures do not correspond in the least to the different frequency of consanguineous marriages in these different countries. It is therefore at least very probable that the causes of deaf-mutism are very complicated, and that hygienic and social conditions also play an important part in its production. As a further proof of the injuriousness of consanguineous marriages *Boudin* has further cited the relative frequency of deaf-mutism among such classes and nations in which consanguineous marriages occur more frequently, that is especially among the Jews, and also among the negroes. *Liebreich* has calculated in the Berlin Asylum for deaf-mutes, 27 deaf-mutes to every 10,000 Jews, whereas to 10,000 Protestants there fall 6 deaf-mutes and to 10,000 Catholics 3.1. This author has also examined the eyes of 241 deaf-mutes in Dresden, Breslau and Berlin and found in 14 retinitis pigmentosa. Of these there were 8 individuals belonging to Jewish families. Whether consanguineous marriages had anything to do with these cases *Liebreich* could not ascertain. The year-book of Prussian statistics gives for the year 1871 in the province of Prussia 17.8 deaf-mutes per 10,000 inhabitants, in Pomerania 12.0, in Posen 14.4; whereas in the whole of Prussia there were per 10,000 Catholics 10.27 deaf-mutes, per 10,000 Protestants 9.55, per 10,000 Jews, 14.8. In 1880 the proportion was for Catholics 10.39, for Protestants 9.84, and for Jews 14.38. (Notice the contrast between *Liebreich's* figures regarding Catholics and these!)

Boudin has also drawn into the argument the geographical distribution of deaf-mutism. The number of people affected is supposed to grow with the seclusion of a locality and its consequent inaccessibility, suggesting of course that consanguineous marriages are thereby greatly facilitated. Thus there were reckoned in the Seine department per 10,000 people 2 deaf-mutes, in Corsica 14, in the high Alps 23, in the Canton

Berne 28. The proportion of deaf-mutes in the Austrian highlands amounts in Austria above the Enns 16.21 per 10,000, in Salzburg 27.81, in Styria 20.6, in Carinthia 49.45; whereas the proportion for the whole of Cisleithania is only 9.6. In the districts of Zell am See (Salzburg), St. Veith, and Wolfsberg (Carinthia), the proportion exceeds 50! No one can accuse here consanguinity alone. Apparently goitre and cretinism are also important factors, though it must be admitted that these two affections have also been spoken of in connection with consanguinity. There is however as yet no justification for this. *Peipers* found recently with regard to the Brühl asylum for deaf-mutes as follows: A little over 1.6% of the marriages which produce deaf-mute children are consanguineous; 2.3% of the deaf-mute children spring from consanguineous marriages. With regard to the asylum in Essen: Just over 2.25% of the marriages which produce deaf-mute children are consanguineous; 3.8% of the children appear to be of consanguineous origin; (for Neuwied: a little more than 4.6% of the marriages which produce deaf and dumb children are consanguineous; 6.1% of the deaf and dumb children spring from consanguineous marriages [small material!]).

Deaf-mutism is consequently by no means such an indubitable result of parental consanguinity as retinitis pigmentosa in spite of all statistical endeavours. But if the frequent occurrence of deaf-mutism among blood-relations is noticed again and again though possibly in association with other different causes, it becomes our duty, looking at the matter from the important practical point of view, to oppose as a rule consanguineous marriages.

Mental degeneration and insanity have also been advanced as decided consequences of marriages between consanguineous men and women. It is said that the descendants of such marriages exhibit diminished stimulativeness and vigourousness, weaker impulsiveness and a predominance of the phlegmatic temperament, a decreased resistibility against disturbances of nutrition and causes of disease. These assertions are hardly suitable for criticism. But if idiocy, epilepsy with insanity and even paralysis are named here, statistics ought to help us to

come to a decision if there are undoubted foundations for the statement, but this can hardly be said to be the case. A pertinent psychiatric-statistical contribution has been recently given us by *Peipers*; it considers a part of the pathogenic predispositions and diseases coming into question, and is highly valuable both as a criticism and in its data. I myself base my observations on the fuller statistics by *Mayet* mentioned in the subsequent chapter.

In the case of congenital malformations of the fingers, heredity can, as is well known, be demonstrated in many cases. It is however possible that here also consanguinity comes into question as a factor aggravating the effect of heredity. But neither these nor other congenital malformations drawn into the discussion can claim any greater significance.

Statistics.—The numerical method on a large scale has hitherto not been adopted for the purpose of deciding the question as to the injuriousness of consanguineous marriages. The older statistical attempts are on account of the smallness of the material upon which they are based and on account of the manner in which their conclusions are drawn so unreliable that there is every justification for taking here into consideration a few compilations by *Peipers* on the subject, and also principally the latest statistics on consanguineous marriage namely those of *P. Mayet* who has tried to utilise very extensive data which have never been requisitioned hitherto. Just now the subject is of actual importance, seeing that some little time ago the Federation of German Governments have decided upon a current census of deaf-mutes in the German Empire to be undertaken by the Imperial Board of Health.

Mayet recognised as the first important point the necessity of obtaining information as to the percentage of the population springing from consanguineous marriages. He thinks he can ascertain indirectly the percentage of consanguineous descendants by ascertaining first the number of marriages between blood-relations. The number of these marriages is at present being established in France, Bavaria, Prussia and Hungary. It is also known though for a number of years only, with regard to Alsace-Lorraine, Saxony and Italy. Finally there exists the

statistical raw material to establish it for Brunswick, Saxe-Meiningen, Hesse, Anhalt and Schaumburg-Lippe, and also for Spain.

The Italian Registrar-General of Statistics has his doubts as to the exactness of the reports issued by the communal authorities, because marriages between cousins do not require there any dispensation.

The respective conditions in France are clearly seen from Tables I and II.

Taken together they give information over a period of 43 years with regard to 126,945 marriages between blood-relations, but it is certain that they do not include all such marriages which have taken place in France. The increase in the proportion during the decade of 1861-1871 (Table I.) may be due to a Ministerial ordinance issued at that time enjoining most careful investigation in that direction. The steady diminution in the average figures (Table II.) may consequently be explained in a similar way, that the regulation in question has gradually been permitted to fall into desuetude. How much of it is due to a possible recognition of the injuriousness of consanguineous marriages it is difficult to say.

TABLE I.

(Source: *Stieder*, Statist. Mittheil. Elsass-Lothringen, Part 12.)
CONSANGUINEOUS MARRIAGES IN FRANCE FROM 1853-1871:

Period	Marriages Altogether	Including Consanguineous Marriages	Per 1,000 Marriages there were Consanguineous Marriages
1853-55	834,840	7,804	9.34
1856-60	1,474,320	14,735	9.99
1861-65	1,508,914	17,937	11.89
1866-71	1,663,239	20,896	12.56

TABLE II.

(Source: Statistique de la France, Années 1875-1898.)

Years, Quinquennial Averages, Total Sum, Total Average	Marriages					Per 1000 Marriages of all Classes there were Consan- guineous Marriages			
	Of all Classes	Between Blood Relations				Of all Classes	Between		
		Of all Classes	Between				Cousins	Uncle and Niece	Nephew and Aunt
			Cousins	Uncle and Niece	Nephew and Aunt				
1875	300,427	3483	3242	178	63				
1876	291,393	3313	3063	179	71				
1877	278,034	2962	2692	178	92				
1878	279,580	3165	2936	182	47				
1879	282,776	3047	2841	146	60				
1875/79 average	286,442	3194	2955	173	66	11,15	10,32	0,60	0,23
1880	279,046	3240	3008	175	47				
1881	282,079	2925	2732	152	41				
1882	281,060	3052	2857	160	35				
1883	284,519	3139	2925	165	49				
1884	289,555	3147	2948	159	40				
1880/84 average	283,252	3101	2894	162	45	10,95	10,22	0,57	0,16
1885	283,170	3155	2969	149	37				
1886	283,208	3059	2801	195	63				
1887	277,060	3297	2476	178	143				
1888	276,848	2755	2552	168	35				
1889	272,903	2878	2552	231	95				
1885/89 average	278,638	3029	2770	184	75	10,87	9,94	0,66	0,87
1890	229,332	2456	2321	101	34				
1891	285,458	2769	2597	146	26				
1892	290,319	3167	2949	142	76				
1893	287,294	2664	2416	213	35				
1894	286,662	2596	2452		144				
1890/94 average	283,813	2730	2547	183		9,62	8,97		0,65
1895	282,915	2526	2397	129					
1896	290,171	2564	2435	129					
1897	291,462	2957	2762	195					
1898	287,179	2834	2650	184					
1895/98 average	287,932	2720	2561	159		9,45	8,45		0,55
In the 24 years 1875—98 to- gether average	6,792,450	71,110	65,573	5077					
	283,852	2965	2753	212		10,45	9,70		0,75

Table III. deals with Bavaria. Here also the average figures become less every 5 years. The frequency of consanguineous marriages in Bavaria is only 6/10 of that in France.

TABLE III.

MARRIAGES BETWEEN BLOOD-RELATIONS IN THE KINGDOM OF BAVARIA FROM 1879 TO 1899.

Years, Quinquennial Averages, Total Sum, Total Average	Marriages					Per 1000 Marriages of all Classes there were Consan- guineous Marriages			
	Of all Classes	Between Blood Relations				Of all Classes	Between		
		Of all Classes	Between				Cousins	Uncle and Niece	Nephew and Aunt
			Cousins	Uncle and Niece	Nephew and Aunt				
1879	35,066	330	283	34	13				
1881	35,538	315	266	38	11				
1882	37,801	311	271	25	15				
1883	35,985	322	272	31	19				
1884	36,733	321	287	29	5				
Quinquennial Average	36,225	320	276	31	13	8,83	7,62	0,85	0,36
1885	36,496	311	273	27	11				
1886	37,324	262	231	19	12				
1887	37,436	242	216	16	10				
1888	37,809	245	221	17	7				
1889	39,515	259	242	11	6				
1885/89 average	37,716	264	237	18	9	7,00	6,28	0,48	0,24
1890	40,004	271	243	22	6				
1891	41,400	206	196	9	1				
1892	41,683	165	158	7	—				
1893	41,605	246	213	23	10				
1894	42,623	235	205	21	9				
1890/94 average	41,463	225	203	17	5	5,43	4,90	0,41	0,12
1895	43,273	262	235	21	6				
1896	45,258	245	217	23	5				
1897	46,481	249	227	16	6				
1898	48,464	295	269	21	5				
1899	50,783	203	185	14	4				
1895/99 average	46,852	251	227	19	5	5,36	4,84	0,41	0,11
The 20 years 1879—99 to- gether average	811,277	5295	4710	424	161				
	40,564	265	236	21	8	6,35	5,82	0,52	0,19

Table IV. contains the figures for Prussia. They are in striking agreement with those for Bavaria. *Mayet* gives also the two averages for the longer periods taken together.

TABLE IV.

MARRIAGES BETWEEN BLOOD-RELATIONS IN THE KINGDOM OF PRUSSIA FROM 1875 TO 1899.

(Source: Parts of "Prussian Statistics" which deal with births, marriages, etc.)

Years, Quinquennial Averages, Total Sum, Total Average	Marriages					Per 1000 Marriages of all Classes there were Consan- guineous Marriages			
	Of all Classes	Between Blood Relations				Of all Classes	Between		
		Of all Classes	Between				Cousins	Uncle and Niece	Nephew and Aunt
			Cousins	Uncle and Niece	Nephew and Aunt				
1875	230,841	1557	1413	106	38				
1876	221,712	1342	1227	96	19				
1877	210,337	1993	1773	166	54				
1878	207,754	1847	1695	122	30				
1879	206,752	1711	1522	159	30				
1875/79 average	215,479	1690	1526	130	34	7.84	7.08	0.60	0.16
1880	208,456	1685	1519	133	33				
1881	209,586	1660	1490	144	26				
1882	217,239	1622	1470	116	36				
1883	220,748	1702	1528	148	26				
1884	225,939	1685	1536	120	29				
1880/84 average	216 394	1671	1509	132	30	7.72	6.97	0.61	0.14
1885	230,707	1653	1489	137	27				
1886	231,588	1563	1380	157	26				
1887	229,999	1549	1423	111	15				
1888	233,421	1526	1408	103	15				
1889	240,996	1513	1375	110	28				
1885/89 average	233,342	1561	1415	124	22	6.69	6.06	0.53	0.09
1890	244,657	1345	1238	87	20				
1891	245,906	1383	1249	114	20				
1892	245,447	1442	1282	139	21				
1893	248,348	1365	1262	85	18				
1894	250,960	1402	1293	100	9				
1890/94 average	247,064	1387	1265	105	17	5.61	5.12	0.42	0.07

Years, Quinquennial Averages, Total Sum, Total Average	Marriages					Per 1000 Marriages of all Classes there were Consan- guineous Marriages			
	Of all Classes	Between Blood Relations				Of all Classes	Between		
		Of all Classes	Between				Cousins	Uncle and Niece	Nephew and Aunt
			Cousins	Uncle and Niece	Nephew and Aunt				
1895	253,729	1360	1232	109	19				
1896	264,822	1376	1263	96	17				
1897	274,693	1409	1282	103	24				
1898	280,344	1227	1126	86	15				
1899	287,408	1393	1289	86	8				
1895/99 average	272,209	1353	1238	96	19	4.97	4.55	0.35	0.07
The 25 years 1875—99 to- gether average	5,922,439	38,310	34,764	2933	613				
	236,898	1532	1391	116	25	6.47	5.87	0.49	0.11

%

Bavaria	6.53	} Marriages between blood-relations.
Prussia	6.47	
Bavaria	5.82	} Marriages between cousins.
Prussia	5.87	
Bavaria	0.52	} Marriages between uncle and niece.
Prussia	0.49	

A considerable difference is seen only in the figures (based on small numbers) relating to marriages between nephew and aunt. They are for Bavaria 0.19% and for Prussia 0.11%.

Table V. gives the Hungarian figures which are very similar.

The circumstance that the figures for Prussia and Bavaria are so similar appears to speak for their accuracy, but *Mayet* thinks they are certainly too low. The returns of the particulars of marriages are namely often filled in subsequently from the marriage-registers, but the latter have no column with respect to the consanguinity of the parties contracting the marriage. The instructions sent out in Prussia in the year 1874 as to the filling-in of the marriage-returns are altogether defective. But the numbers of the present Prussian statistics of consanguineous marriages supply at least minimal figures which are useful in different ways.

TABLE V.

FOR THE YEAR 1900, RELATING TO 169,687 MARRIAGES OF ALL CLASSES.

(Source: Ungar. statist. Handbuch, 1900.)

	Marriages Between		
	First Cousins	Uncle and Niece	Aunt and Nephew
In Hungary, in one year . .	812	49	3
In Croatia	109	10	1
Together	921	59	4
that is % :			
In Hungary, in one year . .	0.55	0.03	0.00
In Croatia, in one year . . .	0.52	0.05	0.00
Together	0.54	0.03	0.00

In England it seems marriages between blood-relations are much more frequent.

In any event, a conclusion as to the percentage of consanguineous descendants in proportion to the whole of the number of children born in wedlock can be drawn from the percentage of consanguineous marriages in proportion to the number of marriages as a whole, if, firstly consanguineous and crossed marriages are equally fruitful, and secondly if the newly-born infants of consanguineous marriages possess the same vitality as the children of crossed marriages. As far as I am concerned I am not at all inclined to admit the parallelism so unrestrictedly as *Mayet* does. The number of births depends as we know from experience upon a variety of circumstances. It is a general natural law that the greater the danger to the descendants in the struggle for existence the greater the propagative faculty. Epidemics f. i. tend to strengthen it. Thus *Moses* says: (Book II, Chap. i.) "But the more they afflicted them the more they multiplied and the more they spread abroad." A

natural consequence of strict in-breeding is rather a relaxation of the propagative energy. Jews have at the present day on an average fewer children than other nationalities (presumably this is not the effect of in-breeding only) but they also have a smaller infantile mortality and a longer average duration of life. With a small number of consanguineous marriages calculations with respect to a few hundred of their children have repeatedly been made; but they showed rather greater numbers. For the present we may therefore assume at least hypothetically that among legitimately-born children the offspring of blood-relations occur in the same numerical proportion as those of non-consanguineous parents. *Mayet* moreover takes the relative number of consanguineous marriages in proportion to 1,000 marriages as a whole, also as the available relative number for the occurrence of all sexual unions, consequently for the entire number of consanguineous descendants among the population.

In Prussia the minimum number of consanguineous marriages is 6.5 per mille. If we take for Prussia or the whole German Empire respectively this relative figure with respect to consanguineous offspring, it would mean with a population of 56.3 millions of the Empire the very considerable number of 365,950 descendants of consanguineous marriages living among the general population.

In the Prussian lunatic asylums it is always ascertained in the case of new inmates whether and in what degree their parents were consanguineous. In the published returns of these statistics "heredity" is entered when the following questions are answered in the affirmative on admission into the asylum: Have mental or nervous disorders, drunkenness, suicide, crime, striking qualities or talents been present in father, mother, (I.) ; grandfather, grandmother, uncle, aunt, (a) on the father's side, (b) on the mother's side, (II.) ; brothers or sister, (III.) ? The entry "heredity" means therefore in these statistics not only a transmission of the same mental disease, but much more. An abnormally increased nervous life, either towards excellence or towards decay, and that not only in one of the absolutely nearest ancestors, is sufficient to establish "hereditary predisposition."

TABLE VI.

Heredity is proved in

Year	1. Simple Insanity						2. Paralytic Insanity					
	M.			F.			M.			F.		
	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity
A. On the number												
1884	2590	814		3020	995		844	136		205	31	
1885	2638	739		3167	991		963	137		244	26	
1886	2999	912		3390	1044		1085	173		227	37	
1887	3037	866		3510	1101		1102	174		242	27	
1888	3002	801		3559	1149		1141	191		244	51	
1889	3165	977		3783	1220		1217	237		293	50	
1890	3438	1068		3974	1309		1315	245		309	33	
1891	3394	1009		3992	1292		1467	229		394	48	
1892	3407	1034		3039	1349		1363	276		386	57	
1893	3789	1086		4231	1376		1501	280		364	65	
1894	3798	1231		4429	1445		1488	269		461	82	
1895	3770	1242		4317	1475		1509	328		429	93	
1896	4098	1236		4463	1437		1646	309		479	69	
1897	4254	1388		4844	1633		1592	309		426	77	
14 yrs. together	47,379	14,503	30.61	54,718	17,815	32.56	18,233	3293	18.06	4703	746	15.86
B. On the number of Insane admitted whose Parents were con-												
1884	27	18		25	11		3	2		—	—	
1885	24	18		22	17		3	2		—	—	
1886	17	11		21	15		7	3		—	—	
1887	12	5		20	11		3	2		1	—	
1888	20	12		19	12		3	—		1	—	
1889	20	14		19	11		3	2		1	1	
1890	23	15		16	13		8	3		1	1	
1891	25	18		19	10		5	4		1	1	
1892	23	16		30	20		8	4		1	—	
1893	33	22		30	19		6	1		—	—	
1894	27	18		19	13		10	7		1	—	
1895	25	21		28	19		6	1		1	—	
1896	27	24		29	22		8	5		1	1	
1897	35	29		29	25		12	5		1	—	
14 yrs. together	338	241	71.30	326	218	66.87	85	41	48.24	10	4	40.00

TABLE VII.

(Compiled by *Mayet* from the

For	Hereditarily predisposed among		
	Males	Females	Both together
1. Simple Insanity			
From patients of all classes . .	30,61% = 100	32,56% = 100	31,7% = 100
From patients whose parents were consanguineous. . . .	71,30% = 233	66,87% = 205	69,0% = 218
2. Paralytic Insanity			
From patients of all classes . .	18,06% = 100	15,86% = 100	17,6% = 100
From patients whose parents were consanguineous. . . .	48,24% = 267	40,00% = 252	45,3% = 257

Prussian lunatic asylums:

3. Insanity with Epilepsy						4. Imbecility and Idiocy						Year
M.			F.			M.			F.			
Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	
of Insane admitted												
517	92		354	72		434	92		284	67		1884
339	60		261	62		426	111		280	83		1885
385	75		281	70		505	123		213	75		1886
369	66		269	63		506	118		328	65		1887
381	76		338	59		523	130		387	105		1888
390	97		311	74		533	163		335	93		1889
457	109		309	82		540	179		422	111		1890
470	106		374	98		667	186		418	109		1891
603	133		439	128		670	175		448	118		1892
786	176		578	126		1066	352		698	201		1893
834	237		667	194		1090	336		765	228		1894
810	262		583	178		924	308		614	199		1895
847	267		550	173		964	292		640	215		1896
981	301		582	168		976	286		659	193		1897
8170	2057	25,18	5897	1547	26,23	9824	2851	29,02	6592	1862	28,25	14 yrs. together

sanguineous (as Uncle and Niece, Aunt and Nephew, Cousins)

8	3		1	—		1	—		5	—		1884
—	—		2	2		4	3		4	1		1885
1	1		—	—		11	3		5	1		1886
—	—		3	1		7	5		7	3		1887
2	—		—	—		14	6		7	1		1888
—	—		5	3		7	3		8	1		1889
2	1		—	—		9	6		5	4		1890
—	—		1	1		8	5		12	7		1891
2	1		2	2		12	5		3	2		1892
5	4		2	2		15	10		9	3		1893
9	5		8	5		17	8		10	3		1894
6	2		3	1		8	3		9	5		1895
3	3		1	1		15	4		7	3		1896
7	—		6	4		8	3		10	4		1897
45	20	44,44	34	22	64,71	136	64	47,06	101	38	37,62	14 yrs. together

preceding table.) Cases with proved heredity.

For	Hereditarily predisposed among		
	Males	Females	Both together
3. Insanity with Epilepsy			
From patients of all classes . . .	25,18% = 100	26,23% = 100	25,6% = 100
From patients whose parents were consanguineous. . . .	44,44% = 176	64,71% = 247	53,2% = 208
4. Imbecility and Idiocy			
From patients of all classes . . .	29,02% = 100	28,25% = 100	28,7% = 100
From patients whose parents were consanguineous. . . .	47,06% = 162	37,62% = 133	43,0% = 150

TABLE VIII. Heredity is proved in Prussian asylums on the

Year	1. Simple Insanity						2. Paralytic Insanity					
	M.			F.			M.			F.		
	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity
C. As												
1884	25	17		22	9		3	2		—	—	
1885	22	16		18	15		3	2		—	—	
1886	13	8		18	12		5	2		—	—	
1887	12	5		18	9		3	2		1	—	
1888	18	11		18	11		3	—		—	—	
1889	17	12		18	10		2	1		1	—	
1890	22	14		16	13		8	3		—	—	
1891	24	17		15	8		4	4		1	1	
1892	20	13		27	18		7	3		1	1	
1893	27	18		27	17		6	1		1	—	
1894	25	16		15	10		10	7		1	—	
1895	21	18		26	17		6	1		1	—	
1896	25	22		29	22		6	3		1	1	
1897	31	25		26	22		12	5		1	—	
14 yrs. together	302	212	70,2	293	193	65,9	78	36	46,2	9	3	33,3
D. As Uncle												
1884	2	1		3	2		—	—		—	—	
1885	2	2		4	2		—	—		—	—	
1886	4	3		3	3		2	1		—	—	
1887	—	—		2	2		—	—		—	—	
1888	2	1		1	1		—	—		—	—	
1889	3	2		1	1		1	1		1	1	
1890	1	1		—	—		—	—		—	—	
1891	1	1		4	2		1	—		—	—	
1892	3	3		3	2		1	1		—	—	
1893	6	4		3	2		—	—		—	—	
1894	2	2		3	2		—	—		—	—	
1895	4	3		1	1		—	—		—	—	
1896	2	2		—	—		2	2		—	—	
1897	4	4		2	1		—	—		—	—	
14 yrs. together	36	29	80,6	30	22	73,3	7	5	71,4	1	1	100
E. As Nephew												
1884	—	—		—	—		—	—		—	—	
1885	—	—		—	—		—	—		—	—	
1886	—	—		—	—		—	—		—	—	
1887	—	—		—	—		—	—		—	—	
1888	—	—		—	—		—	—		—	—	
1889	—	—		—	—		—	—		—	—	
1890	—	—		—	—		—	—		—	—	
1891	—	—		—	—		—	—		—	—	
1892	—	—		—	—		—	—		—	—	
1893	—	—		—	—		—	—		—	—	
1894	—	—		1	1		—	—		—	—	
1895	—	—		1	1		—	—		—	—	
1896	—	—		—	—		—	—		—	—	
1897	—	—		1	1		—	—		—	—	
14 yrs. together	—	—		3	3	100	—	—		—	—	

CONSANGUINITY IN MARRIAGE

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admission of those insane whose parents were consanguineous.

3. Insanity with Epilepsy						4. Imbecility and Idiocy						Year
M.			F.			M.			F.			
Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	Admissions	Of which heredity is proved in	% with heredity	
5	1	1	1	—	—	1	—	—	5	—	—	1884
—	—	—	2	2	—	4	3	—	3	1	—	1885
—	—	—	—	—	—	8	2	—	4	1	—	1886
—	—	—	2	1	—	7	5	—	7	3	—	1887
2	—	—	—	—	—	12	4	—	5	1	—	1888
—	—	—	4	2	—	6	3	—	7	1	—	1889
2	1	1	—	—	—	8	5	—	4	3	—	1890
—	—	—	1	1	—	8	5	—	10	6	—	1891
2	1	1	2	2	—	12	5	—	3	2	—	1892
5	4	4	1	1	—	13	9	—	9	3	—	1893
8	5	5	8	5	—	17	8	—	8	3	—	1894
6	2	2	3	1	—	8	3	—	8	4	—	1895
2	2	2	1	1	—	12	3	—	5	2	—	1896
7	—	—	6	4	—	7	2	—	10	4	—	1897
39	16	41.0	31	20	64.5	123	57	46.3	88	34	38.6	14 yrs. together

and Niece

3	2																	1884
—	—																	1885
I	I																	1886
—	—																	1887
—	—																	1888
—	—																	1889
—	—																	1890
—	—																	1891
—	—																	1892
I	—																	1893
—	—																	1894
I	I																	1895
—	—																	1896
—	—																	1897
6	4	66,7	13	2	66,7	13	7	53,8	13	3	23,1	{ 14 yrs. to- gether						

and Aunt

[illegible]

Let us examine now *Mayet's* table with regard to this heredity (Table VI.). The items in the sum-total of the Part A refer to:

	Male Patients.	Female Patients.
Simple insanity	47,000	55,000
Paralytic insanity	18,000	5,000
Insanity with epilepsy	8,000	6,000
Imbecility, Idiocy	10,000	7,000

A fairly large material. Near each column of admissions there is a column giving the percentage of hereditary cases.

The table gives in a satisfactory manner the items of those mental diseases where the parents were consanguineous. The information on the point refers to a fairly considerable material:

	Male Patients.	Female Patients.
Simple insanity	338	326
Paralytic insanity	85	10
Insanity with epilepsy	45	34
Imbecility, Idiocy	136	101

Together in mentally de- ranged descendants of con- sanguineous marriages . .	—	—
	604	471

We can see from this by comparing the percentages on the same side that the number of those who are hereditarily predisposed is in the insane whose parents were consanguineous much larger, as a rule more than twice as large, than in those who were descended from non-consanguineous marriages. Table VII. gives a clearer view of this conclusion. The comparison between the two relative figures is made easier by taking the relative figure for patients as a whole as 100. We find in the case of consanguineous descendants 218, 257, 208, 150, hereditarily predisposed, against 100 patients of all classes.

Mayet explains, as I believe, these figures quite correctly; the mental diseases arise often on the basis of unfavourable family-predispositions. If the same family-predisposition is present in both consanguineous parents the effects of the heredity are considerably increased. In simple insanity, paralytic insanity,

and insanity associated with epilepsy, heredity plays in the case of consanguineous descendants a part which has the effect of more than doubling the number of cases. As regards imbecility and idiocy, heredity seems to play a less important part.

Table VIII. gives the data separately with regard to the degree of consanguinity. (Under C. D. E.)

TABLE IX.
(Compiled by *Mayet* from Tables VI. and VIII.)

Cases with proved heredity

	Hereditarily predisposed among		
	Males	Females	Both together
1. Simple Insanity			
From patients of all classes	30,61 % = 100	32,56 % = 100	31,7 % = 100
From patients whose parents were cousins	70,2 ,, = 230	65,9 ,, = 202	68,1 ,, = 215
From patients whose parents were uncle and niece	80,6 ,, = 263	73,3 ,, = 225	77,3 ,, = 244
2. Paralytic Insanity			
From patients of all classes	18,06 % = 100	15,86 % = 100	17,6 % = 100
From patients whose parents were cousins	46,2 ,, = 256	33,3 ,, = 210	44,8 ,, = 255
From patients whose parents were uncle and niece	71,4 ,, = 395	100 ,, = 631	75,0 ,, = 426
3. Insanity with Epilepsy			
From patients of all classes	25,18 % = 100	26,23 % = 100	25,6 % = 100
From patients whose parents were cousins	41,0 ,, = 163	64,5 ,, = 246	50,0 ,, = 195
From patients whose parents were uncle and niece	66,7 ,, = 265	66,7 ,, = 254	66,7 ,, = 261
4. Imbecility and Idiocy			
From patients of all classes	29,02 % = 100	28,25 % = 100	28,7 % = 100
From patients whose parents were cousins	46,3 ,, = 160	38,6 ,, = 137	43,1 ,, = 150
From patients whose parents were uncle and niece	53,8 ,, = 185	23,1 ,, = 82	38,5 ,, = 134

Table IX. facilitates the comparison in certain other directions. According to this table it seems that in simple insanity, in paralytic insanity, and in insanity with epilepsy, hereditary predisposition is demonstrable to a greater extent in the offspring of uncle and niece than in that of cousins; it is therefore more pronounced where the relationship is nearer.

It is different with imbecility and idiocy, just as we should

expect, considering that in these affections hereditary predisposition is altogether rare.

Subdivision E. of Table VIII. which refers to the descendants of marriages between nephew and aunt shows in the group of Table IX. hardly any cases of insanity. That such unions are in any way protective against insanity is far less likely than that they are (on account of the advanced age of most aunts) much less fruitful.

Table X. prepared by *Mayet* gives the proportion of descendants of consanguineous marriages to the entire number of sufferers from the forms of insanity already mentioned, and from idiocy.

TABLE X.

PROPORTIONATE NUMBER OF PATIENTS WHOSE PARENTS ARE
CONSANGUINEOUS TO THE ENTIRE NUMBER OF PATIENTS
OF EACH FORM OF DISEASE:
(Compiled from Table VI.)

	1. Simple Insanity			2. Paralytic Insanity			3. Insanity with Epilepsy			4. Imbecility and Idiocy		
	Patients	Of whom with without proved heredity		Patients	Of whom with without proved heredity		Patients	Of whom with without proved heredity		Patients	Of whom with without proved heredity	
A. Insane of all Classes												
M.	47379	14503		18233	3293		8170	2057		9824	2851	
F.	54718	17815		4703	746		5897	1547		6592	1862	
M. & F. together	102097	32318	69779	22936	4039		14067	3604	10463	16416	4713	11703
B. Insane whose Parents were consanguineous												
M.	338	241		85	41		45	20		136	64	
F.	326	218		10	4		34	22		101	38	
M. & F. together	664	459	205	95	45	50	79	42	37	237	102	135

The Insane whose Parents were consanguineous (B), average per 1000 insane persons (A):

M. & F. together | 6,5 | 14,2 | 3,0 | 4,1 | 11,1 | 2,9 | 5,6 | 11,7 | 3,5 | 14,4 | 21,6 | 11,5

Whilst of 1000 inhabitants of Prussia at least 6.47 descendants spring from consanguineous marriages

From these figures it would appear that the proportion of consanguineous descendants suffering from the respective forms of insanity to the total number of individuals who do not seem to be hereditarily predisposed in the sense explained above, is smaller than their proportion to the entire population. *Mayet* expects according to the above given minimum figure of 6.5 descendants from consanguineous marriages per 1,000 of population to find also 6.5 per mille of patients of this class in proportion to the whole number of patients of each class, but instead of 6.5 he gives above: of simple insane only 3.0, of paralytics only 2.9, and of epileptics only 3.5. On the other hand idiocy stands here differently. The proportion of 6.5 is exceeded and becomes instead 11.5.

Table XI. serves for the special study of the conditions referring to the children of cousins and to those of uncle and niece.

This table shows in both kinds of marriages the same results where there is no gross hereditary predisposition to the affections mentioned; as to the three forms of insanity the children are half as frequently insane as the rest of the population. As regards idiocy the conditions are again of a totally opposite character. Here the "hereditarily non-predisposed" progeny of married cousins are relatively almost doubly, and those of uncle and niece almost trebly so much affected as the general population.

Mayet has developed this latter part of his statistical computation for the purpose of establishing how consanguinity acts per se, that is exclusively by the absence of outside blood, and quite apart from the aggravation of the effect of heredity. He thinks he can draw the conclusion that in idiocy the disease is produced by consanguinity as such, whereas in the other three forms of insanity consanguinity appears to be rather an advantage in the case of "hereditarily non-predisposed" persons.

Personally I can admit with absolute certainty only that much, that in idiots also, if in addition to consanguinity the well-known stigmas of hereditary predisposition are also manifestly present, the effect is a vastly greater one. I should further conclude that descent from consanguineous parents does not

TABLE XI.

PROPORTIONATE NUMBER OF PATIENTS WHOSE PARENTS WERE
RELATED TO EACH OTHER AS COUSINS OR AS UNCLE
AND NIECE, TO THE ENTIRE NUMBER OF
PATIENTS OF EACH FORM OF DISEASE.

Compiled from Tables VI. and VIII.

1. Simple Insanity			2. Paralytic Insanity			3. Insanity with Epilepsy			4. Imbecility and Idiocy		
Patients	Of whom with without proved heredity		Patients	Of whom with without proved heredity		Patients	Of whom with without proved heredity		Patients	Of whom with without proved heredity	

A. Insane of all Classes

M.	47379	14503		18233	3293		8170	2057		9824	2851	
F.	54718	17815		4703	746		5897	1547		6592	1862	
M. & F. together	102097	32318	69779	22936	4039	18897	14067	3604	10463	16416	4713	11703

C. Insane whose Parents were related as Cousins.

M.	302	212		78	36		39	16		123	57	
F.	293	193		9	3		31	20		88	54	
M. & F. together	595	405	190	87	39	48	70	36	34	211	101	120

The insane whose Parents were related as Cousins (C), average per 1000 insane persons (A):

M. & F. together	5.82	12.5	2.70	3.80	9.66	2.54	4.98	9.98	3.25	12.85	19.13	10.26
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Whilst of 1000 inhabitants of Prussia at least 5.87 descendants spring from marriages between cousins.

D. Insane whose Parents were related as Uncle and Niece.

M.	36	29		7	5		6	4		13	7	
F.	30	22		1	1		3	2		13	3	
M. & F. together	66	51	15	8	6	2	9	6	3	26	10	16

The insane whose Parents were related as Uncle and Niece (D), average per 1000 insane persons (A):

M. & F. together	0.64	1.58	0.22	0.35	1.48	0.11	0.64	1.67	0.29	1.58	2.12	1.37
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Whilst of 1000 inhabitants of Prussia at least 0.49 descendants spring from marriages between Uncle and Niece.

Taking above under C, 5.87 = 100, the relative figures are under C =

M. & F. together	99	213	46	65	165	43	85	170	55	219	329	175
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Taking above under D, 0.49 = 100, the relative figures are under D =

M. & F. together	131	322	45	70	302	22	131	341	59	322	433	280
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per se predispose to insanity. But on the other hand I think it would be going too far to admit like *Mayet* a favourable influence with regard to a large number of diseases. That idiocy may become manifest in the descendants of consanguineous marriages even where the gross (physical but especially psychical) symptoms of hereditary predisposition are absent, I can easily explain by the law of heredity laid down above, namely, that two similar predispositions which on account of their slight intensity are not recognisable in the parents individually, combine in the offspring and acquire by this combination such an energy that they appear as a decided characteristic. For this reason I have already at the commencement of my remarks taken into consideration the aggravating influence of consanguinity upon the effect of heredity.

Of great value is *Mayet's* arithmetical proof that of 16,416 idiots admitted in Prussian asylums only 237 were descendants of consanguineous marriages. Even if we add to this number those idiots who are maintained in their parents' homes, the proportion is not such as to justify a serious view of the injuriousness of consanguineous marriages. There are probably about 200,000 consanguineous descendants among the inhabitants of Prussia.

In all likelihood the conditions as regards congenital deaf-mutism and retinitis pigmentosa are similar to those regarding idiocy. It was also *Mayet* who has furnished statistical proofs in favour of this opinion with respect to deaf-mutism. *L. Hirsch* has found the percentage of consanguineous marriages undoubtedly higher among the congenitally-blind than among the other blind. Of 340 congenitally-blind, 16 that is 5% were descended from consanguineous marriages, of 50 blind persons with retinitis pigmentosa 9, that is 18%. This author maintains that it is quite clear that this percentage of consanguineous marriages exceeds by far that among the non-blind population. Many authors, f. i. *Leber* have in the case of retinitis pigmentosa found even a higher percentage of consanguineous parents than 18%. (See Chapter XV.)

Practical conclusions.—The foregoing facts and remarks do not therefore contain anything which compels us

to see in the results of consanguineous marriages more than an aggravation of the effects of heredity through the consanguinity. It has not been possible to establish without doubt that the absence of outside-blood is alone responsible for the degeneration in the offspring. Even the optimum of in-and-in-breeding, or its latitude, we can estimate in man mainly by the aid of ethnographical and statistical calculations in association with the laws of heredity; its definite determination is one of the problems of the future.

The practical aim of anti-consanguinists is strict legislation against consanguineous marriages, that of the consanguinists the abolition of the existing prohibitions (see above). If scientific investigation of the consequences of in-breeding is to influence public opinion one way or the other without bias or special motives, it is necessary to find for it a safe and broad foundation. For the present however we must say: *Non liquet*.

For the practitioner on the other hand it is much easier to arrive at a decision. As far as the problematical optimum of consanguineous marriages with regard to the inheritance of definite moral qualities, etc. is concerned he will prefer to leave it alone. But generally speaking it will be his duty to dissuade from the contraction of marriages by blood-relations. He will depart from this principle on very rare occasions only, even if the relatives intending to marry each other appear to be in a general sense absolutely free from any hereditary predisposition. For according to the laws of heredity the possibility is not precluded, as I have already said several times, that two similar predispositions which on account of their slight intensity were not recognisable in the parents individually may combine in the offspring and become so pronounced as to assume a definite pathological character; and this is moreover especially likely to be the case in consanguineous marriages.

But the practitioner will also do well to oppose marriages between people belonging to very distant races, as f. i. between Whites and Negroes. (See p. 27 in Prof. *Gruber's* article.)

Literature.

- A. Dittrich*: Die Bedeutung der Vererbung. Tübingen 1903.
Ribbert: Ueber Vererbung. Marburg 1902.
Ch. Darwin: On the origin of species. 1859, deutsch von *Bronn* (1863);
 Variation of animals and plants under domestication, 1867.
Schenk: Handbuch der Botanik. I. Bd.
Reibmayr: Inzucht und Vermischung beim Menschen. Leipzig-Wien
 1897.
Ribot: L'hérédité, 1873 (deutsch von *Kurella*).
Scherbel: Ueber Ehen zwischen Blutsverwandten. 2. Aufl. Berlin 1896.
Schiller-Titz: Folgen, Bedeutung u. Wesen d. Blutsverwandtschaft. 3.
 Aufl. Leipz. 1892. (Beide letztgenannten, sehr lesenswerten Werke
 enthalten die sorgfältig gesammelte Literatur fast des ganzen Gegen-
 standes).
O. Lorenz: Lehrbuch der Genealogie. Berlin 1898.
Voisin: Étude sur le mariage entre consanguins dans la commune de
Bats (Ann. d'hygiène publ. et médecine légale II. Ser. t. XXIII. 260).
 Paris 1865.
Peipers: Consanguinität in der Ehe. Zeitschr. für Psychiatrie. 58. Bd.
 S. 793 (1901).
P. Mayet: Verwandtenehe und Statistik. Jahrb. der internat. Vereini-
 gung für vergl. Rechtswissenschaft und Volkswirtschaftslehre. VI.
 u. VIII. Bd. Sep.-Abdr.

V

Climate, Race and Nationality in Relation
to Marriage

V

CLIMATE, RACE AND NATIONALITY IN
RELATION TO MARRIAGE

By **W. Havelburg, M.D.** (Berlin)

PART I

Definition of acclimatisation.—By acclimatisation in general we understand the accommodation of any living being to all the imaginable influences of a locality foreign to it or to its nearest ascendants, and where the conditions of existence are different from those of its place of origin. This definition of acclimatisation applies both to animals and plants. As regards the acclimatisation of human beings it is also required that they should retain in a foreign country and under altered conditions of life their previous ability to live physically and mentally and to continue their activity without any detriment to their health and energy. Where a whole group of individuals of the same class is concerned, a further requirement is that the duration of life and the mortality among them and their offspring shall not be materially different from those prevalent among the natives, and that they retain as colonists the faculty to multiply themselves in the usual manner and to procreate a numerous and healthy offspring capable of resisting the vicissitudes of life without the introduction of fresh blood or a constant advent of European emigrants. The number of births must exceed that of the deaths.

These are the points of view from which scientists look at the subject. In reality, acclimatisation depends to a great extent also upon economic and political con-

ditions. Religious scruples also are often an unfavourable element in the settlement of emigrants, and similarly disadvantageous is the more or less comfortable mode of life to which they were accustomed in the old country. It is chiefly the women who find it very difficult to accommodate themselves to the new household arrangements and the new kind of domestic servants; and then there is the question as to the bringing up and the education of the children. With these subjects we are of course not concerned here.

It is necessary to point out that individuals as such may find it fairly easy to accommodate themselves to the new conditions but that it does not follow that a whole group of individuals may be equally successful. For this reason we have to distinguish between individual acclimatisation and class acclimatisation. It is chiefly the latter which shows us how the respective influences have been at work through a long series of generations whose end-representatives we see before us at the present day. Such race-acclimatisation is according to *Hirsch* identical with colonisation.

The French call the natural acclimatisation, that is the one which individuals undergo without any measures on their part, "acclimatement," and the substance of the measures which are taken for the purpose, principally the hygienic arrangements, "acclimation." "Petit acclimatement" they call the individual acclimatisation, and "acclimatement de la race" that of a whole class or race.

The test of accomplished acclimatisation is therefore the physical thrift and the multiplication of immigrated colonists. When they succeed in living like the natives without any special aids, they are said to be naturalised.

Acclimatisation in the cold and temperate zones.—The acclimatisation of people going from the south to the north takes place easily. *Plinius* and *Vitruvius* already knew this: quæ a frigidis regionibus corpora traducuntur in calida, non possunt durare, sed dissolvuntur; quæ autem ex calidis locis subseptentrionum regiones frigidas, non modo non

laborant immutatione loci valetudinibus, sed etiam confirmantur. It is always easier to protect oneself against cold than against intense and persistent heat. The regulating apparatus is more adapted to deal with the former than with the latter; in addition, there are no endemic diseases to contend against.

Coloured individuals (Indians and Negroes) coming in ships right from the tropics into our winter bear the temporary cold very well and without injury. The negroes in the United States have shown themselves highly capable of acclimatisation under favourable social conditions. The prosperous population of Lower Canada is to the extent of about 85% of French descent.

Some authors maintain as a matter of course that inhabitants of the tropics as a rule accommodate themselves more easily to the temperate climates than vice-versa the inhabitants of the latter to the tropics.

Yet this cannot be said to be generally the case. A regiment of negroes stationed in 1817 in Gibraltar was almost totally destroyed by phthisis within 15 months. The wholesale settlement of negroes in the Antilles was also unsuccessful; the annual average population of the same in the years 1816-1832 was 696,171; of these 345,320 were males and 350,851 females; to 100 births there were however 111 deaths so that the black population was bound to diminish considerably in the course of time.

In any case there is in reality an immediate interchange possible between the populations of the tropics and those of the temperate or cold zones. The inhabitants of the tropics have hardly any desire to emigrate to regions where they would have more work to do and under worse climatic conditions. On the other hand the fertility of the tropics has since the time of their discovery ever been a source of great attraction to the civilised nations of Europe.

The examination into the possibility of acclimatisation on the part of a race or a nation is therefore limited in practice to the question of the acclimatisation of Europeans, as it is almost exclusively nations of that continent and belonging to

the "white" race that are striving to colonise the territories inhabited by weaker races or possessing sparse populations. The present day means of communication greatly facilitate rapid changes of domicile.

The climate of the tropics.—Travellers who make a temporary stay in the tropics experience there the same discomforts, but to a much greater extent, as are experienced in our latitudes during equally hot days. The enjoyment of the manifold beauties and of the luxuriance of nature is very much marred by the physical fatigue, by intense perspiration, by an easily supervening sense of lassitude and by the constant fear of succumbing to some more or less serious disease. One has always the feeling that it is not given to man to walk among palms with impunity. Immigrants who have to endure permanently the influences of the tropics undergo many changes, both physical and psychical, some of a general kind which affect the whole human organism, and others which are of a more individual character and dependent upon sex, material circumstances or occupation. At the beginning of their sojourn in the tropics, immigrants feel well and strong for a short time only; for soon they commence to look weak and pale, their physical capability diminishes and their previous enjoyment of life lessens considerably.

Injurious effects of the tropical climate.—The experiences of the British, French and Dutch governments with regard to their troops consisting of Europeans and natives prove by figures what was instinctively felt before by everyone, namely that the mortality of the European populations in tropical countries is considerably higher than at home, and also very much higher than that among the indigenous inhabitants.

The mortality among English soldiers was occasionally 4 times as great as that of the black troops; and it has even happened that the European troops perished almost to a man while the natives or the troops related to them remained almost entirely free from disease.

In France the mortality among the military during

the last few years has been 7.6 per thousand; whereas in Algiers and Tunis in 1883-1884 it was 11.6 per thousand, in Cochin-China in 1862, 91.8 per thousand and in Senegambia 526.9 per thousand.

The morbidity also is considerably higher in these tropical regions.

Of 1,000 persons in the British Navy in the year 1889 the following were attacked by disease:

In English Stations 75, in West-African Stations 122, In West-Indian Stations 104, in East-Indian Stations 158.

In the period of 1878-1882, there were on the daily sick-list in the Indian army, Europeans 56 per thousand and natives 44 per thousand.

The diminished resistibility against the influences of the climate is apparent not only in the immigrants alone but also in the next generation. According to the principles of heredity, such a rapid change and adaptation could hardly be expected; if an adaptation takes place at all it can only be achieved in the course of many generations.

The infantile mortality among the military population of India is very great; in 1870-80 it was about 70 per thousand against 22 per thousand in London. Major *Bagnold* was of the opinion that in spite of all attempts no regiment in India was able to bring up as many children as were required to replace the pipers and drummers.

Regulation of the body-heat in the tropics.—

The proper regulation of the temperature of the body is the first and most important demand made on the newly-arrived immigrant by the physiological process of acclimatisation.¹ The greater warmth and the greater humidity of the air, both of which combined are the principal factors in the climate of the

¹*Schellong*, Akklimatisation u. Tropenhygiene, *Weyl's Hdbch. d. Hygiene*, Bd. I. — *Scheube*, Tropenklima u. -Physiologie, *Eulenburg's Real-Encyclopädie*. — *Däubler*, Grundzüge der Tropenhygiene, 1900. — *Mense*, Tropische Gesundheitslehre u. Heilkunde, 1902. — *Rubner*, Lehrbuch der Hygiene, 1903.

tropics, produce an effect in the immigrated European. The latter has to adjust himself by means of the regulating apparatus contained in his organism to conditions to which the native is by nature accustomed.

As is well known, there are in the tropics permanently high temperatures which are further subject to daily exacerbations dependent on the position of the sun. The humidity of the air which is in Central Europe in the summer only 10 mm. is in Zanzibar 22.5 mm.; in Batavia 21 mm. at a mean annual temperature of 25.8° (Centigrade). According to *Wernich* the relative humidity at sea and on the coast of tropical countries is 80%. The seasons and the various situations (more or less remote from the equator, relative height above the level of the sea) have of course a somewhat modifying effect on the conditions just mentioned.

Wolpert and *Rubner* have shown that in a relative humidity of 60-62% and at a mean temperature reaching occasionally a maximum of 25.7° C., it is quite possible for people to feel perfectly well and to perform hard work without any interruption in the evaporation of the perspiration. The climatic conditions of some altitudes in the tropics fall under this head, and in these localities immigrated Europeans can retain their former ability to work. Where there is a possibility of an undiminished elimination of water it is possible even in the desert of Sahara where the air is so dry for white men to perform long and wearisome journeys on foot, which they could not possibly accomplish without danger under the influence of such high humidity as is present in the low-lands or on the sea-coast of the tropics.

Comparison of Europeans with coloured races.—As regards the lowlands in the tropics we notice however that there are marked differences between the immigrated Europeans and the natives with reference to the regulation of the body-temperature. Light work causes very soon in the European considerable fatigue, while the negro or the Malay hardly experiences any discomfort; the coloured people eliminate easily during moderate labour a greater amount of heat into the surrounding air; at the same time their skins are almost dry,

while Europeans perspire very freely. *Eykman* has on the basis of ordinary and not by any means extreme circumstances established by figures certain facts relating to these existing differences. Thus he found f. i. that a moderately working Malay excretes through the urine and the fæces 738 grammes of water, and through the perspiration 1,577 grammes; whereas an European under similar circumstances excretes 1338 and 1730 grammes respectively. The former eliminates therefore 2315 grammes of water, and the latter 3068 grammes.¹

It should also be mentioned here that coloured races drink very little and that they secrete much less urine than Europeans, who endeavour to compensate by copious drinking the great loss of water they suffer through profuse sweating. In any case there is a great difference noticeable between them as to the excretion of water for the purpose of regulating the temperature of the body.

It is as yet a much debated question how and to what extent coloured people effect the elimination of their watery secretion. It is not impossible that they excrete by the lungs greater quantities of water than Europeans. The lung-capacity of the Malay is greater in proportion to their stature, and it has also been noticed that they exhibit an increased respiratory frequency. The commencement of the respiratory passages in the negro is more voluminous so that he can breathe more freely. An increased respiration might therefore enhance the elimination of watery vapour.

It is clear that the skin of coloured races acts differently in respect to radiation of heat and secretion of sweat than does that of white people. During a time-unit a coloured man doing a moderate amount of work eliminates more cutaneous heat into the surrounding air, whereas the white man appears to retain the heat much longer in his skin.

Glogner found that one square centimeter of Malay skin discharges in $\frac{1}{2}$ hour 10.5 heat-units, and the same surface of European skin only 8.7. There is, besides, a

¹1 Kilogr. of water forms in the evaporation 572 large calories.

small difference in the body temperature, which is 37.20° C. in the Malay, and 37.33° C. in the European.

European immigrants also show considerable individual differences in the elimination of heat, which is not the case in the Malay. *Eykman* estimates the average difference in the elimination of heat through radiation and conduction between Malays and Europeans as 4.7% in favour of the Malays. The same thing may be said with regard to negroes; the heat proceeding from the dry skin of a negro is perceptible from some little distance.

Anatomical peculiarities which might explain the different behaviour of the skin in whites and in coloured people have not been found. Neither the observations of *Henle* and *Krause* that the skins of negroes are thicker than those of the Caucasian race, the cutis in general varying by about 1 mm. and the epidermis in some places by nearly as much, nor those of *Däubler* to the effect that coloured skins have larger sweat-glands and sebaceous glands of double the size of those in white skins, are of any practical importance.

In contrast with coloured people who are by nature endowed with special means to regulate their temperature in accordance with tropical conditions, the whites are dependent exclusively upon the increased secretion of perspiration. It is true that the organism has at its disposal regulating aids which act independently and by way of the nervous system. When the body-temperature is higher the capability of the muscular system diminishes, and the amount of body-heat generated decreases, but with it decreases also the ability to work. If under circumstances however these functions do not co-operate properly or at the proper time, there occurs a congestion of heat which manifests itself by insolation or other pathological conditions. By an increase of respiration the elimination of vapour is somewhat assisted, but neither by this means nor by the relaxation in the cutaneous capillaries is much heat given off.

New-comers perspire very freely after the slightest exertion; after many years the skin becomes accustomed to the altered conditions and the perspiration is less profuse.

Nutrition in the tropics.—There is a wide-spread belief that the amount of nourishment required differs materially in different climates, and that particularly in the tropics far less suffices to sustain life. Recent research has shown this opinion to be wrong, and that the difference is only a very slight one.¹

Under the influence of occasional high temperatures, the appetite of an European diminishes for the time being; where the temperature is perpetually high the appetite may also be permanently affected. New immigrants lose their appetite after a very short stay in hot places, and their nutritive requirements adapt themselves only gradually. It is impossible to state a definite temperature at which this anomaly occurs, as it varies in different individuals.²

Requirement of water in the tropics.—The quantity of water eliminated principally by the urine, the perspiration and evaporation is replaced by drinking. The thirst is however as we know from experience even in the temperate climate of Europe, increased by drinking and the tendency is to drink more cold water than is necessary. Natives prefer warm drinks such as coffee and tea as these quench the thirst in smaller quantities and do not produce the evil results of large quantities of water such as profuse sweating which irritates the skin and wets underlinen and clothes, a depressing effect on the stomach and intestines, and an increased chance to catch cold. The blood-pressure becomes greater, the cutaneous capillaries are more injected, and the pleasing sensation experienced during the act of drinking is succeeded by a general unpleasant feeling of discomfort. If as it frequently happens alcohol in some more or less concentrated form is taken instead of plain water, and the opportunities for doing so are not absent, the combined effects of the double injury soon become apparent. It is a plausible saying that one should quench his thirst in the tropics not by glassfuls but by spoonfuls.

¹*Voit*, Nahrung in den verschiedenen Klimaten, Arch. f. Anthrol. Bd. XXIII.

²*W. E. Ranke*, Einwirkung d. Tropenklimas auf die Ernährung d. Menschen. 1900.

Other physiological and pathological processes in tropical acclimatisation.—We have already seen that one of the consequences of the equilibration of the body-heat is an increase in the respiratory frequency. In new-comers it amounts to 20 or more respirations per minute; in those who have become acclimatised by a longer stay the number falls and is about 16-20.

According to *Plehn* the pulse is at first quickened by about 6 beats, after a time it is in the European, like in the native, about 68-78 per minute. In other respects there is no change observed.

The same author has found that the body temperature is in new-comers on an average 0.46 degree (C.) higher, and that it may go up by as much as 2 degrees. After acclimatisation there is no increase and the temperature fluctuates according to seasons between 0.18-0.4°.

As regards the vascular system there is a tendency to congestion in internal organs particularly after dietetic errors and especially after the consumption of alcohol, also after severe exertion.

The heart is in consequence of these various processes severely affected either primarily or secondarily. There is hardly an European who does not when visiting the tropics suffer from an irritability of this organ. In those acclimatised the heart and the blood-vessels adapt themselves to the changed conditions, so that nothing abnormal can be detected. Though this happens frequently, one meets on the other hand many Europeans in the tropics whose hearts are functionally weak or exhibit irregularities, such as light dilatation; occasionally functional murmurs are heard which appear especially after exertion.

The liver especially is in the tropics an organ to which during congestion the circulation looks for an outlet. The liver, both in immigrants and natives, contains more blood than in temperate climates. Immediately after arrival in the tropics the liver begins to grow in volume, perhaps in consequence of the larger quantity of fluids consumed; but this enlargement, which is often insignificant only, remains permanent without causing any sort of trouble. This enlargement of the liver was formerly

a subject of fabulous importance with regard to acclimatisation in the tropics. It was supposed to be productive of larger quantities of bile, which is not a fact; it was suspected that on account of the enlargement of the liver in the tropics the pulmonary capacity is diminished, (a condition which has not been proved) and that the liver acts therefore as a sort of vicarious organ, being accordingly styled "the lung" of hot climates. From a pathological point of view the liver in the tropics certainly demands the frequent attention of the medical man, seeing that disturbances take place in this organ which are caused by alcohol, malarial infection, dysentery, various micro-organisms, animal parasites, etc. so that these disturbances must be attributed less to the climate than to an unhygienic mode of life or to a pathogenic infection.

The secretion of urine in the tropics is diminished in consequence of the increased elimination of water through other channels. For this reason it is also not possible to give figures with regard to the daily secretion of urine. When perspiration is very profuse, about 700 ccm. of urine, or even less are discharged daily; otherwise about 1 litre is the usual quantity. As the amount of urine diminishes, so does its specific gravity go up, and the latter fluctuates between 1018-1024. The quantity and specific gravity of the urine and sweat depend of course on the amount of fluid consumed.

Urinary substances are eliminated both by the urine and the perspiration. The quantity of the products secreted as a result of metabolism is about the same in the tropics as in temperate countries. Some statements that less nitrogen is eliminated through the urine may be explained by the neglect to take into account the quantity eliminated through the perspiration. According to *Eykman* after light work about 12.8 grammes of nitrogen are on an average daily eliminated through the urine, and 0.76-1.36 gr. through the skin. The acclimatised European discharges therefore quantitatively hardly any less nitrogen than the inhabitants of temperate climates, only he discharges it in a different manner.

Both voluntary and involuntary muscles are affected by the relaxing and debilitating influence of the tropical climate. This

is seen in the lesser working ability of Europeans compared to the natives, and may be demonstrated by means of the dynamometer.

The opinion already expressed by *Lavoisier* that the excretion of carbonic acid is diminished in hot countries has recently been experimentally proved by *Rubner* to be correct.

As regards the consumption of oxygen the views hitherto existing on the basis of theoretical calculations have turned out to be erroneous. Owing to the higher temperature, both air and gases are expanded; a definite volume of air contains therefore less oxygen than in cooler regions. The higher percentage of vapour contained in the tropical atmosphere also contributes to a further quantitative reduction of oxygen. It was consequently assumed that the consumption of oxygen in hot countries is diminished and an attempt was made to find the cause of tropical anæmia in the reduced quantity of oxygen contained in the inspired air. It was however overlooked that the inspired air, no matter how constituted, is in all climates warmed first in the respiratory passages to about the same degree (that is 35° C.) and well mixed with vapour. The amount of oxygen which can still be taken up in accordance with physical laws is sufficiently present in the air of the tropics. Moreover examinations of the blood have shown that the number of red and white corpuscles, and the quantity of hæmoglobin are by no means always diminished in the tropics. The anæmia is not necessarily a result of the stay in the tropics; if it is seen frequently, there may be pathological and other reasons, physical, nervous and moral present.

One meets in hot countries very often people with a pronounced grey-yellowish and sallow complexion, and healthy-looking immigrants acquire in the course of time such an appearance. The condition has been given the special name of tropical anæmia, but examinations of the blood have revealed no definite changes in the normal elements of the hæmoglobin, in the specific gravity, or in the amount of water contained in the blood (*Marestang, Eykman, Glogner, Plehn*) provided of course there was no real anæmia in consequence of malaria, chronic diarrhœa, dysentery, ankylostomiasis or some other

cause. Tropical anæmia is now regarded as a normal condition of the skin, the pigmentation of which is influenced by the altered conditions in the circulation, secretion and illumination. Owing to the antagonistic hyperæmia in the abdominal organs (*Stokvis, v. d. Scheer*) the cutaneous capillaries are less injected, the upper cellular layers of the skin are on account of the increased activity of this organ added to and saturated with moisture; the horny layer of the epidermis swells and obstructs the transparency of the redness of the capillaries which would give the skin a rosy appearance in temperate climates. Besides, the inhabitants of the tropics and particularly the women avoid as a rule with a kind of fear the direct influence of the sun.

The nervous system is during the transition period, and also during the stay in hot countries severely affected through the physiological processes discussed above, even where they occasion no disturbances. Almost always and with rare exceptions there appear signs of a more or less well-marked neurasthenia and in connection with it distressing insomnia, susceptibility to mental impressions, nervous irritability, finally apathy, moral depression, defects of memory, and similar consequences. Every mental exertion requires in the tropics a special amount of energy different in a subjective degree. The advance in the civilisation of China, Japan, India, Australia, and South America shows that a certain amount of mental productiveness is possible in hot countries, but such progress as has been achieved by communities in temperate climates can hardly be expected from the tropics; and it is very unlikely that they will ever supply humanity with original and profound thinkers or investigators.

The increased irritability manifests itself also in the sexual life. The desire in both sexes is increased, and the fruitfulness of the man greater. Altogether the conditions of life and the daily events are greatly under the influence of sexual excitement both in a good and a bad sense. There seems to be no theoretical reason why morality should suffer, but as a matter of fact there is a great deal of transgression under the tropical sun committed against connubial and non-connubial conditions. With regard to Africa specially a condition has been created under the name of "tropical frenzy," but the probability is that individuals

unable to control themselves when away from the watchful eye of the law and of society would lose their equilibrium even at the North Pole.

The digestive organs also exhibit manifold deviations. The digestive juices are more fluid and consequently less effective; the muscular coats of the stomach and intestines become more lax. Numerous micro-organisms which thrive abundantly in the moist tropical climate are introduced into the digestive tract along with the solid and liquid ingesta. Atonic gastric complaints and hypochlorhydria are frequently observed. The digestion of proteids is often interfered with; and a diminished desire for animal food manifests itself. Intestinal catarrhs and constipation are frequent complaints resulting from atony of the bowels or from an increased loss of water through perspiration.

Digestive disturbances, anæmia, and neuroses influence each other reciprocally in the tropics in the same way as they do in temperate climates.

The statements that a slight hypertrophy of the left ventricle occurs constantly in consequence of the increased cardiac activity, diminished secretion of urine and greater arterial pressure (*Martin*), and that an acclimatisation-atrophy of the kidneys, especially of the cortical substance, is caused by the diminished urinary secretion, have received no confirmation.

Finally it is worth mentioning that the skin becomes in the tropics much more sensitive, and that it is affected by even insignificant changes in the temperature. Diseases caused by cold and especially rheumatism in different forms and degrees of severity threaten every inhabitant of the tropics.

Mass acclimatisation.—In looking back at the most important changes mentioned above which the organism of the immigrant has to undergo under the influence of the tropical climate we see that a considerable demand is made upon the physiological capability of each individual. If such individuals succeed singly in accommodating themselves it does not follow, as I have already said that a large number of colonists coming from a similar stock would be equally successful in settling in the tropics and there founding families and generations. In the course of the physiological process of acclimatisation there are

numerous transitions to pathological conditions, and whereas travellers and scientists formerly believed that the acclimatisation of white races in the tropics is impossible, or at least possible in the case of certain European nations only, among which the Germans were certainly not included, this opinion has during the last two decades undergone considerable modification. It is important that this modified view is shared by doctors, naturalists, and officials who speak from personal experience which they obtained in the tropics.¹ The prospects that Europeans can settle fully and completely in hot climates have improved materially; but whether they will be able to accomplish all physical labour equally with the natives is a question which the future only can decide.

Favourable predisposition.—There are elements favoured by nature which have apparently no inclination to be attacked by endemic diseases, and especially by malaria, and which if attacked can overcome the maladies without any serious consequences. Such are youthful, healthy and vigorous elements not hereditarily predisposed to disease. For the Germanic race it appears that the most suitable age for acclimatisation is that between 23 and 40; for the Roman race the individual suitability begins much earlier, namely at 16. Those who have previously trained their bodies by gymnastics or other physical exercise are generally speaking better adapted. Infants die easily from the consequences of dentition or digestive disturbances; too young people are not sufficiently hardened against the unaccustomed fatigues and the new conditions of an altered mode of life; they soon become anæmic and fall a prey principally to malaria; older people are no longer sufficiently elastic.

Predisposition of females.—It cannot be denied that European women are on the whole more susceptible to the climatic influence of the tropics than the men. Those whose bodies have become hardened through work and physical activity are in a more favourable position. The case is however different in those women who emigrate as daughters or wives along with their fathers or husbands without any regard to

¹*Wulfert*, Akklimat. d. Europ. u. insbes. d. german. Rasse in d. Tropen, u. ihre haupts. Hindernisse v. *Volkmann's* Samml. klin. Vorträge. No. 279.

their physical fitness. Under the influence of the climate and among unaccustomed surroundings they soon become anæmic and nervous; uncommonly frequent are menstrual disturbances. Older opinions were to the effect that all European women living in the tropics suffer from leucorrhœa; and though this may not be quite true, the malady is in any case exceedingly prevalent. It is found that females do not suffer so much from malaria, but this is probably due to their more domestic employment.

Sexual life and marriage of Europeans.—

These women show themselves unequal to the demands of married life; they easily miscarry. Young mothers as a rule lose their milk. Further, endometritic diseases are very prevalent and they lead to all kinds of uterine disturbances, to amenorrhœa, menorrhagias and sterility. In addition, the general condition of the women deteriorates, they become emaciated, the nervous life and the regulated psychical state are disturbed, and the married life of Europeans is therefore often a sad one. Whilst the sexual requirements of the husband are in the tropics greater the resistibility of the wife diminishes. But although these distressing conditions are very frequent, especially in the case of young women who have come to the tropics direct from well-regulated European surroundings to find in the place of the expected bliss serious disappointments, there are nevertheless females who accommodate themselves perfectly to married life as wives and mothers.

It has formerly been asserted that the fruitfulness of Europeans in the tropics diminishes and that it does not go beyond the fourth generation. I will deal later more fully with this assertion; for the present I wish to observe that owing to the chronic indisposition of the European women the men are often induced to have recourse to healthy natives. Hence the acclimatisation of the European race is often frustrated on the one hand by the sexual incapacity of the women, and on the other it gives rise to various mixed races.

The main reason however why a continuation over several generations of descendants of an unmixed European race is so rare in the tropics lies undoubtedly in social conditions. The

formation of a household is to the immigrant an encumbrance, and an impediment which prevents free movements. Many a married European finds difficulties in educating his children; he therefore sends his family to Europe or returns there himself. Others do not feel the want of European family life and prefer a native woman; no longer accustomed to the restraint necessitated by intercourse with civilised women, they find an efficient substitute in the free mode of living with natives to whom they need pay no consideration. The offspring mix with the native children from among whom they naturally select their sexual companions.

Tropical climate at the coast, in the interior, on islands and on the mountains.—The consideration of the peculiarities of the tropical climate must take place from various points of view. Most emigrants going out independently proceed to places on the coast, where the hygienic conditions are none of the best and in addition to the high temperature the atmosphere is very moist. The insular climate in the tropics is similarly constituted and its effect is equally depressing.

Different however from this moist-hot climate which acts as an obstacle against acclimatisation, is from the practical standpoint the more favourable dry climate of the interior; there the relative humidity in the dry and wet seasons varies considerably, but is not permanently as great as on the coast.

The most favourable climate is that of the mountainous regions. The higher the zone the more it approaches the European climate. *Jacob Lind*, as early as 1770, called attention to the difference in the climates of the highlands, islands and valleys of tropical countries, and shewed how differently they affect the health. But only recently attempts have been made to take advantage of this fact by settling colonists in high localities or by utilising to the greatest possible extent for dwelling places elevated districts in the neighbourhood of the coast-towns.

But though there are no endemic diseases, such as malaria, yellow fever, dysentery, etc. present in elevated districts, and the feeling of comfort is greater, there are nevertheless com-

plaints among the Europeans, such as anæmia, sterility of the women, great loss of child-life; they also manifest an inclination to inflammatory and catarrhal diseases.

Hygiene in the tropics.—The possibility of acclimatisation on the part of single individuals as well as entire colonies owes a great deal to the progress which the hygiene of the tropics has made in the last two decades. Whereas formerly everything was done empirically it is now recognised that a definite system must be followed how and where hygiene is to interfere. Special and rational rules have been adopted with regard to agriculture, irrigation, housing arrangements, etc.; suitable principles are acted upon as to clothing, nutrition, recreation, physical culture in the healthy and unhealthy condition, and though much remains yet to be done, much has already been accomplished. *Hüppe*¹ is right in saying: "The main difficulty of acclimatisation in the tropics no longer lies in the question of adaptability, but in the question of personal and public hygiene. The problem of the acclimatisation of Europeans in the tropics has been replaced by the problem of the hygiene of Europeans in the tropics."

Consumption of alcohol.—A few words with regard to the injurious influence of alcohol may be indicated here. *Emin Pasha*, doubtless an authority on questions connected with the tropics, said: "Those who avoid all excesses, and especially the abuse of alcoholic liquor, can afford to laugh at the fairytales on the dangers of the tropical climate." He thinks that Europeans suffer from it so much just because they cannot keep off intoxicating liquors. All experiences agree upon the injuriousness of an excess of alcohol, no matter in what form indulged in, upon the physical as well as the moral condition; it is indeed an obstacle against acclimatisation if not a downright cause of diseases which tend to shorten life. *Wulffert* sees the principal dangers of alcoholic abuse in its effects upon the digestive, nervous and vascular systems, in the disturbance of the physical regulation of the body-temperature, and the diminished resistibility of the body against disease-producing micro-organisms.

¹Berl. Klin. Woch. 1901.

Whites who are given to the drinking-habit will never become acclimatised in tropical conditions. *Fiebig*¹ gives examples from the Dutch-Indian army, especially during the campaign against Atjeh in 1898, showing that European abstainers in the tropics proved more fit than the natives.

Acclimatisation of races.—In a lecture on acclimatisation² *Virchow* said: "In medical circles no one has ever imagined anything else but that such an adaptation is connected with material alteration of the organism, that it is not therefore a question of a mere change of outer costume, but of an internal transformation creating to some extent entirely new organic conditions. In the course of time an habituation takes place whereby the number of diseases and deaths occasioned by the climatic conditions undergoes diminution." In another place *Virchow*³ said: "There is an acclimatisation but a limited one. Certain races are more adapted for acclimatisation and others less so." The latter he called *vulnerable* and these are absolutely unsuitable for the colonisation of tropical regions. On the other hand *Weissmann* maintained that the favourable individual variations present in a colony persist and are propagated and that they can transmit their favourable qualities to their offspring. Thus racial acclimatisation is accomplished. The less resistible succumb, the more resistible endure and transmit their greater resistibility to their descendants. It is therefore a question of "natural selection," and the query arises: Is racial acclimatisation accomplished by favoured individuals of a particular race or by favoured individuals of any one race, in other words, are there with regard to acclimatisation, privileged races?

Among Mongolian nations the Chinese have endeavoured to form independent colonies and have succeeded in spreading themselves over the Asiatic and Australian continents as well as Polynesia. On account of the different climates of their country which stretches from the Siberian border to beyond the tropics

¹Archiv. für Schiffs- u. Tropenhygiene. 1901.

²LVIII. Deutsche Naturforscherversammlung.

³Arch. f. path. Anat. Vol. 103. Descendenz u. Pathologie.

they have in the course of time acquired a certain resistibility. They have shown themselves superior to the white colonists because they have easily assimilated with the native races of all countries where they settled and formed numerous mixed products.

The coloured races have as a rule been transplanted against their will and consequently become acclimatised under unfavourable circumstances, in a state of subjugation, without the help of hygienic precautions, perhaps because the movements always took place towards tropical and sub-tropical regions with a climate resembling that of their original home. An acclimatisation of mid-African negroes in the coast-lands of North Africa, in Egypt, Tunis, Tripoli, Morocco, Algeria has never been possible, and similarly the transportation of negroes to Ceylon, Mauritius, the West-Indies, Mexico, and other such places whose climate ought to have suited them, has also proved futile; it is of course possible that the miserable treatment which they received is accountable for these failures.

What climatic differences may come into question with regard to acclimatisation is seen in the horse, which is not adapted to the damp and warm climate of the tropics, but which thrives in hot and dry countries, such as Arabia, North Africa, Australia, etc.

In the tropical parts of South America, in the Antilles, and in the south of the United States the negro race prospers, thrives and is reproductive; it has even penetrated farther north and also changed its physiognomy, the cheek-bones are less prominent, the lips not quite so thick and the nose less flat, the woolly hair is not so profuse and the angle of the face not so acute as in the African negro (*Bastian*).

Wherever the negro race appeared it mixed willingly or unwillingly with people of their own kind or with those of other races, as is seen by the numerous half-breeds in existence. In respect to physiological functions and mode of life, as well as in the manner of geographical distribution, the Arabs approximate very much the negro type.

Special examples of pure racial acclimatisation we find in the Jews and the gypsies who have that in common between them

that they generally try to pair with individuals of their own race. The former, of Semitic and especially of Syrian-Arabian descent, and the latter of Aryan origin, are on account of their migrations and their historically well-known resistibility considered as true types of cosmopolitans. The Jews have a certain homogeneity with the Arabs, Moors, and the old Phœnicians, and have gradually advanced towards the Mediterranean Sea ever since they became dispersed after the destruction of the Syrian empires. They subsequently spread further North and West into colder regions where they became acclimatised; this acclimatisation is however one of a lighter kind and not greater, according to *Bertillon*, than that of all Aryan nations.

In speaking of the great adaptability of the Jews, one is really bound to think more of their accommodation to the political and social circumstances of the countries in which they have settled. A physical acclimatisation to bodily exertions such as are required f. i. by agricultural pursuits, they had no need to undergo seeing that circumstances necessitated their adoption of other vocations; nor have the Jews either formerly or recently attempted to settle in large numbers as colonists in tropical countries. Sporadic Jewish emigrants have not formed there any Jewish families worth speaking of, as either they or their descendants have departed from the tradition of the Jewish race and intermixed with natives of their adopted countries.

The principal European emigrants who have shown themselves particularly suitable for acclimatisation in tropical regions were the South European nations, the Spaniards, Portuguese, Maltese, Italians and Levantines. They dwell in the countries round the Mediterranean, which, to begin with, possess an average temperature by 14-18° (C.) higher; theirs is the great historical high-way which migratory nations have traversed from time immemorial, perhaps from the days of pre-historic man. The Iberian nations are a mixture of various acclimatisable elements which stand in relationship with the Semitic races of the Arabs and Phœnicians. The other nations

named above are also to a great extent mixed products; they all have a dark complexion which is suitable for the tropics. The Italians have settled in the countries near the Red Sea, and in North and South America; the Portuguese in tropical Africa, in Southern India and in Brazil; the Spaniards in the West-Indies, in Mexico, on the large South American continent, in Peru, Chili and the Argentine republic. The white Spanish population of Cuba which amounted in 1775 to 96,440 individuals grew so that in 1861 it consisted of 793,484 inhabitants, though it must be admitted that a large part of the addition is due to new immigrants and race-mixture. But the emigrants of these South European nations have not remained pure, they have mixed with the natives to a large extent, so that the populations which claim to-day to be legitimate Cubans, Mexicans, Venezuelans, Brazilians, Chilians, Peruvians, etc. are in reality mixed products of Spanish and Portuguese descent.

The two principal maritime nations of Germanic blood, the English and the Dutch have become firmly established in tropical India and the Sunda Islands, but they have treated these regions more from the point of view of productive colonies than as an oversea outlet for their European over-populations. Many Englishmen and Dutchmen have emigrated to the colonial possessions of their respective countries, but have only exceptionally founded there permanent families; as a rule they remained either alone or with their families for some more or less prolonged period after which they returned to Europe.

In the French colonies situated in the tropics there have also been no permanent populations formed which are of pure French blood. The emigrants have either intermixed with other races and nations or returned home. It is therefore impossible with respect to the French also to say definitely whether they possess on the whole an adaptability for acclimatisation in the tropics.

Since the year 1830 the colonisation of Algeria has been attempted, at first with unfavourable results, but more successfully during the last few decades. According to *Bertillon* the circumstances in Algeria during 1855-1856 were as follows:

	Births	Deaths	Difference in births
Spaniards	46	30	+16
Maltese	44	30	+14
Italians	59	48	+11
French	41	43	— 2
Germans	31	56	—25

It would therefore appear that the Spaniards and Italians were in the most favourable position, and that these two nations are capable of permanent colonisation without the necessity of bringing fresh elements from the mother-country. The French showed if no great mortality at least a very limited number of births, and the Germans a high mortality. The conditions have in spite of improvements remained practically the same at the present day; the purely French element, particularly that part of it coming from the South of France has become acclimatised. Those who thrive best in Algeria to-day are Frenchmen from the South of France, Spaniards, Italians, and above all, Jews; among the latter there were in the last decade 55 births to about 28 deaths. The German colony (Alsace-Lorrainers) is as before still in a bad way; it shows the largest mortality, formerly 55 and now 39 deaths per 1000 inhabitants, against 32 births.

The Germans have up to recently had no proper opportunity of showing whether they possess as a race any fitness for acclimatisation in tropical countries. An early attempt in Brazil has proved futile, since when D. Pedro in 1831 abdicated the Brazilian throne, two battalions of German troops were compensated after their disbandment by a grant of large tracts of country between Pernambuco and Utinas. In spite of all possible assistance from the Brazilian government the whole number of them died within one year from the effects of the injurious emanations from the soil to which they were subjected as agriculturists. (*Helfft.*)

Mixture of races.—We see that wherever colonising enterprises on the part of white people have taken place, numer-

ous mixtures with the natives or other coloured races have been the results. Neither in East-India, nor in the West-Indies, nor in Cuba, Porto Rico or Brazil, have the families of the original European settlers remained unmixed beyond the third or fourth generation. But the greatest vitality has been exhibited by the numerous cross-products resulting in the tropics from the mixture between Northern immigrants and native women. The English who have intermixed with the latter less than others have therefore obtained the least success as colonisers, though their commercial relations would seem to point them out as the most suitable for the purpose.

Many endeavours have been made to find out whether there are, after all, any cases in the tropics, of European tribes which have remained pure through several generations. Statistics are unfortunately not available as they are either absent altogether or utterly unreliable. We are dependent entirely on individual traditions and moreover great mistakes are apt to occur when considering whether a racial acclimatisation has taken place. The European mixed-breeds regard themselves according to the demands of political or social necessities sometimes as natives and sometimes as foreigners. In India cross-breeds are frequently called Europeans. Travellers who have reported on the subject have for these reasons frequently been misled into wrong calculations.

It is reported that in Reunion a French colony exists under the name of "Petit-Blancs" whose ancestors immigrated after the occupation of the island under Louis XIV, about 1650, and who have reproduced themselves without intermixture. Individually they have become quite acclimatised, they pursue hunting and agriculture, are rustic inhabitants, and though poor they are bodily in the best condition. The town-dwellers, on the other hand, who are descendants of the well-to-do portion of later French emigrants show a high mortality.—*Rousselet* found in 1867 in Central India (Bhopal) in the heart of the Windhya mountains a

small tribe of European descent which may be traced to a French immigration that took place in 1557, and which has retained the European character of the colony by avoiding inter-mixture with other than European nations, especially Portuguese.

The Spanish tobacco-peasants in Cuba are said to have prospered so markedly that their number of 95,440 in 1774 went up to 793,884 in 1861, and that their mortality was lower than that of the mother-country.

There are said to be six families in Peru which have kept themselves pure for 200 years.

Stokvis particularly has taken great pains in establishing the pedigrees of pure European families in the tropics, and gives a few examples from Surinam. Captain *Schultze* has given a minute description of the genealogical tree of a Dutch family in Java recording its history for more than 100 years.

Stokvis mentions also the population of the very small island of Kicser in the Malay Archipelago which includes European inhabitants who claim descent from Dutch soldiers that had remained there 150 years ago after the destruction of the fortress and married European women. But as Kicser is frequently visited by sailing vessels the crews of which generally stay there for some time, it is doubtful whether the inhabitants have not occasionally received an addition of fresh blood. (*Däubler.*)

A careful examination of family registers for which absolute purity was claimed has in the cases where such an examination was possible proved that intermixture with foreign blood has taken place or that such blood was introduced by some lateral chain that could not be followed up.

The Spanish and Portuguese immigrants to the tropical countries of the West-Indies, Cuba, Ecuador, Brazil, and Mexico whose families have become the present-day inhabitants and are proud that their blood is of the purest possible, cannot, judging from the ordinary course of circumstances be looked upon otherwise than that intermixture has played a part

in their family histories. The Iberian nations have always shown an inclination to mix their blood with that of the nations among whom they dwelt. Even in their physiognomy these people have changed so much that they do not in the least resemble any longer their European ancestors. Spaniards and Portuguese have in spite of the great resistibility which they are said to possess against tropical influences remained only relatively pure in Porto Rico; they avoid every kind of fatiguing work. The older white population has almost entirely mixed with Arab, Indian and Negro blood as well as that of Mestees.

Whether pure racial propagation in the tropics is at all possible cannot under present circumstances be said. A European colonisation which has remained incontestably pure through several generations without any admixture from outside has never been undertaken systematically; it is therefore impossible to say whether such an experiment could or would succeed. Natural conditions seem to show that accommodation takes place differently. *Stokvis* thinks that not only is an European acclimatisation possible, but also complete colonisation. The latter however never takes place in reality in a pure form. Even the Boers to whom he refers and who are regarded as suitable for the tropics are fond of staying in the tropical highlands and frequently return to the Transvaal.

The successful colonisation in the South and West of Africa by the English and Dutch, in the Argentines and in Chili etc. by Spaniards, in the Southern States of Brazil (Santa Catharina, Rio Grande) on the Rio de la Plata estuary, and in Queensland by Germans, does not come here into consideration, for these are places situated in the temperate zone the climate of which resembles that of the respective European home-countries and which present in some respects considerable advantages.

The pairing of the Europeans settled in the tropics with native women is a necessary means of naturalisation, if it is only for the reason that white women decline and grow old far too soon. But there are European women accustomed to the tropics from whose union with natives a strong progeny has

resulted. The propagation of the white race is dependent on an addition of foreign blood, even if it emanates from coloured or mixed races; thus the offspring of Europeans in the tropics retain their vitality and acquire finally definite types.

Pairing with native races is particularly beneficial in facilitating the acclimatisation of the white race. By such means qualities are formed which render the sojourn of Europeans in foreign climes endurable. "In this way the race changes to a severer extent than by Darwin's 'Selection' or other influences" (*Virchow*).

Endemic diseases.—It is finally necessary to mention the endemic diseases which influence the process of acclimatisation to an enormous extent, and which form the principal factors upon the basis of which the question of the possibility of complete European adaptation in the tropics has been judged. Although such a possibility has been admitted by some with regard to a physiological accommodation to the climate, the greatest doubts have arisen as to whether it is possible to overcome the pathological conditions, and even if such a successful result could be obtained in the case of single individuals it can hardly be expected in an entire colony or in a large number of people. Some observers, in fact, relying upon existing data have absolutely denied the possibility of adaptation to the pathological difficulties of the climate.

As an illustration we give here the following figures relating to the military population of the Dutch Indies consisting of 12,974 Europeans and 15,521 natives, for the year 1874 (according to *Uffelmann*):

	Per 1000 Diseased	Europeans Dead	Per 1000 Diseased	Natives Dead
Malaria	747.9	15.0	362.3	3.6
Dysentery	106.8	23.1	24.8	3.8
Cholera	62.7	32.5	23.5	8.3
Hepatitis	21.7	1.15	1.7	0.38
Enteric fever	10.0	0.38	0.51	0.33
Beri-beri	2.2	0.38	35.4	1.35

In Finschhafen (German New Guinea) there were

according to *Schellong* in 1886-1888 no less than 99% of the Europeans living there suffering from malaria; about 50% of all Europeans and Malays were ill with malaria every month, and those who had to stay for 16 months were faced with the prospect of having malaria 6 times. The mortality of Europeans from malaria was 90 per thousand, that of the Malays 0.

As we shall see from the following remarks considerable progress has been made in these respects during the last two decades. This applies especially to malaria which has always been one of the principal factors in connection with acclimatisation.

Malaria.—From the earliest times of historical medicine malaria has been known and always associated with the influence of the soil.¹ The necessity of establishing human habitations in the neighbourhood of water supplies, either the sea or rivers, brought with it the constant struggle against malaria, the cause of which was up to a few years ago supposed to lie in a miasma emanating from the soil.

As a result of the ubiquity of malaria just in those tropical regions which are the first goal of colonists, the opinion became universal that the ability of Europeans to become acclimatised in the tropics is synonymous with their ability to become acclimatised against malaria, and that the process of adaptation is completed when the persons otherwise acclimatised are capable of cultivating by themselves the ground which nourishes them. The dangers of malaria do not lie only in the injury to health or in the frequent relapses which lead to severe anæmias and cachectic conditions often ending with death, but also in the circumstance that two of the most frequent consequences of the disease are sterility in females and an enormous infantile mortality. For these reasons the foundation and growth of families are so difficult.

The only remedy to counteract the evil influences of malaria

¹) *S. Reinhold Ruge's* Bearbeitung der Malaria im Handbuch der pathogenen Mikroorganismen von Kolle und Wassermann, Bd. I.

English Translation by Eden Paul, M.D. (Rebman Company, New York and London.)

is supposed to lie in the cultivation of the soil and especially in its drainage, but this can only be accomplished by sacrifices, personal risk or the hands of coloured labourers, Negroes or Malays, who are known to possess a certain immunity against the disease. But as it is hardly possible to anticipate that the tropics will in this respect become so changed as to present no dangers to Europeans arriving there, former observers have all expressed the opinion that an acclimatisation against malaria does not exist and never will. *Virchow* pointed out that the sanitary measures adopted in the Roman Campagna, though carried out under circumstances vastly superior to those in the tropics, were nevertheless failures. But what a change has taken place since! In that fever-stricken locality Ostia, one of the worst of its kind in the Campagna where no one ever ventured to remain for a few hours after dark three English investigators, *Samson*, *Low* and *Rees* have in 1900 spent several months without being attacked by malaria either at the time or subsequently, thus proving the correctness of the modern view and the reliability of the prophylactic measures resulting from it.

By the very important researches of *Laveran*, *Golgi*, *Ross*, *Koch*, and many others, the malarial parasites and their developmental phases as well as the part played by the mosquito have been established in a most convincing manner. The malaria-mosquito theory explains clearly the relations between the disease on the one hand and age, sex, employment and race on the other, whereas formerly everything was mixed up in the idea of acclimatisation.

Children and young persons to the age of about 35 form the majority of sufferers from malaria; the first years of child-life show the greatest predisposition to it. Sex does not appear to play any important part, and if women are generally less liable to attack it is because their domestic duties prevent them from being out in the open as much as men, thus reducing their exposure to risk. Pregnant women are not immune, as it was formerly believed, and child-bed is even a predisposing factor. The explanation is simply that infected mosquitoes are attracted under such circumstances.

Though no race or nationality is exempt from malaria, the peoples descending from the Caucasian race (Europeans, Arabs from the Berber States, Hindus) show, according to *Hirsch*, the greatest predisposition, and namely in the sense that an attack of the disease predisposes as a rule to further attacks; the Malay and Mongolian tribes have a somewhat lesser predisposition, and least of all the Ethiopian race; individuals belonging to the latter do suffer from malaria, but only seldom and then in a mild form.

R. Koch has explained how immunity is acquired by the natives; he found that adult natives in malarial countries are free from the disease, whereas the children suffer most terribly up to 100%. If they recover they gradually acquire by fresh attacks or relapses a definite immunity. The number of children infected with malaria diminishes as age advances; at the age of 10 there is generally found as a last sign of former malaria an enlarged spleen, which also disappears towards puberty, so that the adult native appears finally as a healthy individual immune against malaria.

If we wish therefore to be informed how and to what extent a certain locality is subjected to malaria we must examine not only the adults, but the children as well, and particularly the very youngest among them. Where the latter are affected malaria is endemic and one must be prepared for the outbreak of an epidemic should circumstances favour the development of the malarial parasites. *Koch* has also demonstrated that immunity against one form of malaria f. i. the tertian, does not protect against other forms such as the quartan or tropical.

Thanks to the improved knowledge of the cause and distribution of malaria, and to the perfected methods of examination of the blood we are to-day in a position to take precautions with a definite object in view, and by adopting *Koch's* advice to undertake the stamping-out of malaria.

The personal prophylaxis consists in the administration of 1 gramme of quinine, according to *Koch's* method, every 10th or 11th day, for the purpose of destroying the parasites circulating in the blood; embrocation with ethereal oils and the

use of mosquito-nets or curtains are of value as protectors against the parasite.

The general prophylaxis endeavours to prevent infection by destroying the mosquitoes. It has been proposed to pour petroleum over the pools in which the anopheles finds a breeding place, and then to kill the larvæ. But this practice has not proved successful for various reasons. Similarly, the attempts to drain the marshy districts have fared no better. The idea is theoretically correct but on account of the great expense it entails, capable of being carried out in small localities only. Where anopheles-containing pools can be easily drained, this must be done, of course, but it is necessary to remember that the process must be repeated regularly and most scrupulously, otherwise the result obtained will be of little value.

Opposed to these measures, is the proposal of *Koch* to exterminate the malarial parasites, and for this purpose it is necessary to find out not only the severe cases but also the very mild ones which hardly ever come under the notice of the medical practitioner. This can be done by means of the examination of the blood. By following this method *Koch* succeeded in a short time in rendering Stephansort (New Guinea) perfectly free from malaria. But as the circumstances are not everywhere so favourable as in Stephansort it is hardly to be expected that the results will always be the same, but reports from other places seem to offer every encouragement. On the other hand *Plehn*¹ points out that *Koch's* proposal is not free from disadvantages. In large localities it is practically impossible to find out and examine all the inhabitants; the physical exertion of a small number of medical men such as can be obtained in the tropics would hardly be equal to the task; and the constant coming and going of the ordinary traffic would certainly prove an insuperable obstacle. The process recommended by *Koch* would moreover arrest the natural immunisation which goes on in native children, and this would result in their being attacked by the disease later in life when they have changed their habitation. It would in fact mean injury

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to a large number of natives in order to protect a small number of immigrants.

Yellow fever.—A more limited significance than malaria is possessed by yellow fever, a disease associated entirely with tropical and sub-tropical conditions and one which spreads only under special climatic circumstances. As permanent foci may be regarded the Antilles and Mexico which are generally supposed to represent the cradle of yellow fever; from there the African coast from the mouth of the Senegal to the 5th degree of northern latitude became infected with Sierra Leone as the principal centre; this was also the case with the Brazilian coast, especially the ports of Rio de Janeiro and Santos, which are at the present day suffering from a permanent epidemic.

Yellow fever attacks with predilection the white race; the yellow race is affected to a much smaller extent, and the negroes are practically absolutely immune against it. Mulattoes show little predisposition but not the immunity possessed by the pure African race.

It appears that the susceptibility to yellow fever stands in inverse ratio to the average temperature of the zone from which the individual springs. *Griesinger* has pointed this out with reference to Europeans by showing that Norwegians, Russians, Germans and Dutchmen are far more liable to be attacked than Frenchmen, Spaniards, Italians and Portuguese. The same thing has been demonstrated in America. North-Americans, Argentinians, Uruguayans, and Chilians are far more susceptible than Brazilians, Mexicans, Peruvians and Bolivians. Negroes, though immune against yellow fever, become susceptible to it or lose their immunity if they are born in colder zones or stay there for some years.

The susceptibility of white immigrants into yellow fever zones diminishes while they remain there. Acclimatisation has always played an important part in the estimation of the danger threatened from yellow fever. According to an old doctrine, it was assumed that a stay of 5 years in a yellow fever district was sufficient to impart such immunity as is possessed by native children in their 5th year of age, and this appears to agree

with the facts. An interruption in the sojourn annuls the immunity obtained, and the latter can moreover be acquired only where yellow fever is prevalent, and not at a greater or lesser distance. Thus f. i. the permanent inhabitants of Rio de Janeiro are immune, but not so Brazilians coming from other parts of the country. Men and women are equally liable to be attacked, women perhaps slightly less because they are less exposed to infection. Among immigrants, there are generally more male sufferers than female.

During pregnancy, child-bed and lactation, non-acclimatised women have a greater predisposition to the disease.

The mystery surrounding the cause of yellow fever has also been cleared up recently with a probability amounting almost to certainty.¹ After several unsuccessful attempts to find the specific schizomycetæ, a North American expedition sent out to Cuba in 1900 to study the cause of yellow fever and having at its head *Reed, Carroll, Agramonte* and *Lazear*, was fortunate in discovering that it is possible to transmit the disease by a prick from a mosquito infected with yellow fever. The kind of mosquito coming in question is the *stegomyia fasciata Theobald*; a kind of *culex* present in well-known yellow fever localities. But the real organic cause of the disease is unfortunately not yet known. For practical purposes, however, much is gained by the discovery that mosquitoes act as hosts and transmitters of the disease-poison. The precautionary measures indicated are no longer vague and of a general hygienic nature, but consist in endeavours to prevent mosquitoal inoculations. The prophylaxis is therefore similar to that relating to malaria, only comparatively more simple. Much has already been done, and successfully as far as it is possible to judge, in fighting yellow fever in Havana in the manner mentioned.

In 1901, all the cases reported were isolated, protected against mosquito-bites, and their surroundings disinfected; 26,000 breeding-places of mosquitoes were looked up and destroyed. In October, generally the worst month, there was not a single death or illness, as against 308 cases of illness and 174 deaths from

¹For details see my article in the Berl. Klin. Woch. 1903. 31-32.

yellow fever in the preceding year; the returns for 1902 are equally satisfactory.

Judging by analogy from what has been said with reference to malaria, immunity against yellow fever is probably acquired through repeated bites from infected mosquitoes which produce mild forms of the disease that escape observation. We may say that the mosquito-theory of yellow fever explains the whole epidemiology of this disease in a simple and natural manner and that we are at present in a position to account for its method of dissemination, its predilection for certain places and its absence from others. We can also understand now why—and this is a fact which has been known for more than a century—elevated places in yellow fever districts are free from the disease in spite of the frequent contact of persons and objects with infected centres. All these phenomena are connected with the *stegomyia fasciata* and its mode of life; wherever this insect can fly and remain yellow fever will under circumstances spread.

Cholera.—With regard to the two most dreaded infectious diseases, cholera and plague, it has also been possible since their respective causative agents have been recognised, to gain points of view which are practically important for purposes of prophylaxis. Cholera and plague deserve mention here as they are in the tropics endemic diseases; they have repeatedly assumed the form of violent epidemics affecting regions far beyond their centres, and even that of pandemics.

Cholera is for the whole world with the exception of the Ganges Valley an imported disease which has made the tour of the globe in 5 great pandemics. The infection takes place, as proved so convincingly by *Koch* and his school, by means of infected water, coming from rivers, wells or other similar sources, occasionally through infected articles of food, milk, etc. if these have in any way come in contact with the infected water. The isolation-measures formerly in use have shown themselves ineffective in arresting the disease because those who suffer from cholera obviously and seriously do not as a rule travel, and mild cases which are just as infective are not

recognisable. On the other hand, the precautionary remedies suggested by *Koch's* theory and consisting of a good water-supply, reliable sewerage, isolation of the first patient observed and of those infected by him, thorough disinfection of the discharges and all objects coming in contact with them, have proved of benefit as prophylactics. Gastric and intestinal affections, even simple errors in diet, increase the individual predisposition; experience has shown that men, women and children are equally affected, and that puerperal women are more liable to be attacked.

Plague.—The specific bacillus of plague, discovered by *Yersin* and *Kitasato* has the peculiar property that it is very easily conveyed to rats and mice and that these animals as well as infected human beings, who are apparently in good health though harbouring the plague-bacilli, can import the disease and disseminate it. The infection takes place through abrasions in the skin and the entrance of the bacilli, in pulmonary plague through inspiration of the same; it is questionable whether the infection can also take place through the medium of food and drink. With regard to plague also the susceptibility of the sexes is alike.

If we consider the progress made in the recognition of the cause of these diseases and in the knowledge of the means by which to combat and to avoid them, we may fairly say that they no longer constitute any obstacles against the acclimatisation of European colonists. On the contrary! The latter have thanks to their social education certain advantages over the natives who also have no natural immunity against these diseases, even where they are endemic. Cholera is perennial among the inhabitants of the Ganges-delta, and as regards plague it has been noticed that Negroes are more liable to attack than others, after them come the Berbers and Nubians, and in the third place the Arabs; Europeans are most favourably situated in this respect and from among them the Northerners are more protected than the Southerners such as Turks, Greeks and Armenians. The Parsees are said to possess a certain natural immunity. The Chinese however who are otherwise particularly suited for colonisation purposes are also subject to the

influences of the endemic diseases. According to *Hirsch*, predisposition plays here a less important part than social considerations; superior hygienic conditions seem to have a greater significance in regard to predisposition than membership of some definite race.

Protective inoculation.—We have already seen how the immunity against malaria formerly believed to be attached to the negro race is produced by the endurance of the disease at an early age. Exceptionally there may be occasionally noticed a natural immunity against cholera and plague also, arisen individually and spontaneously; experience however teaches that such immunity can only be acquired through overcoming an attack of the respective infection, and it is upon the basis of this process that endeavours have been made to protect individuals by inoculation against cholera and plague. Though partisan hatred and favour may incline one way or the other, practical successes cannot be denied; the inoculations have in any case for emigrants to dangerous localities at least the meaning of important precautions.

An example of successful inoculation we have in vaccination which has resulted in rendering small-pox as no longer a dangerous element in regard to the settlement of Europeans anywhere. Those who are opposed to vaccination, and there are hardly any among them who are scientifically trained medical men, should see the striking difference in countries where small-pox is prevalent between the vaccinated and non-vaccinated without distinction of race and social position, and they would soon admit their error.

Dysentery.—By the provision of a good water supply it would be possible to counteract the dangers arising from dysentery, as the producers of this disease, the special bacilli and amœbæ are generally introduced into the body through the agency of water. The dreaded tropical abscess of the liver is in most cases also a consequence of amœbal infection. It is superfluous to add that for purposes of prophylaxis against dysentery improved general sanitation and careful nutrition are necessary requirements; suitable arrangements for disposing of the fœcal discharges generally, and in cases of dysentery

particularly, are essential for the prevention of the spread of the disease.

Rational nutrition can do much in preventing the gastric and intestinal troubles so frequent in the tropics, as well as the consequences to which they give rise. Diseases of the liver are not so common as it is generally believed and are not *eo ipso* a result of the climate.

A glance at the pathological dangers of the tropical climate reveals the fact that the armamentarium of modern hygiene is able to cope with them, and that they are not permanent but temporary factors which oppose acclimatisation. With the advance in general civilisation it will probably be possible to overcome all endemic diseases.

Possibility of acclimatisation.—Only as far back as 10 years ago the opinions whether there is a possibility for the white race to become acclimatised in the tropics were sharply opposed to one another; the number and reputation of those observers who denied that possibility sufficed to render their opinion the preponderating one, and the latter received additional support from the conviction that the danger of malaria was insurmountable. As adherents of this opinion we find most English authors, among the French, *Dutrouleau*, *Leroy de Mericourt*, *Jousset*, *Fonsagrives*, *Baudin*, and others; among Germans, *Helfft*, *Mähly*, *Röver*, *Virchow*, *Hirsch*, and others. The Dutch author *Stokvis* was an absolute optimist; *de Quartrefages*, *Treille*, *Bertillon*, *Rochard* though not believers in the absolute capability of Europeans to become acclimatised looked upon the same with rather more favour. Unanimity of opinion on this important question has not been obtained as yet, but the scientific advances recorded above have resulted in creating a different point of view. Hope and confidence have been established that the difficulties connected with acclimatisation will be overcome, and the great activity displayed by scientists, governments and associations in colonisation efforts, as shown f. i. in Germany, France, Holland and Italy, is proof positive that the problem is seriously being dealt with. And although the practical results obtained so far are not so considerable as one would wish, more may certainly be expected and looked for. The

march of conquest which the white race has undertaken in the tropics is in reality an attempt to better the economic conditions of humanity, and it will require the united efforts of all nations to bring it to a successful issue. The old saying "white heads and black hands" will for the present have to remain in force, and the Negroes, the Indians and the Malays will, in view of the fact that they can multiply and thrive in the tropics without the assistance of other races, for some time to come furnish the requisite manual labour. In the temperate zones, the coloured races are inferior to the whites or to the Aryan mixed races.

Gradual acclimatisation.—More than 30 years ago *Quatrefages* made the suggestion of gradual acclimatisation; i. e. that colonists should proceed by stages from station to station until they reached the insalubrious districts. *Stokvis* has recently asserted that Europeans who are acclimatised in the sub-tropics can easily adapt themselves to the tropics, and *Felkin*¹ believes that the white race can accommodate itself to the tropical climate provided that one or two generations show first their vitality in sub-tropical regions.

At the tropics as far as the 11th degree of lat. the humidity of the atmosphere and the heat are not so great as in the real equatorial countries; the soil is also healthier; then there is the differentiation in the seasons which gradually disappears the nearer we approach to the equator, so that in the countries near the latter there is not even any distinct difference between rainy and dry periods. It is this circumstance in association with the humidity of the soil which retains the stagnant moisture and the greater humidity of the air that act injuriously upon the physiological functions of the whites. For these reasons the idea of gradual acclimatisation is certainly worthy of consideration.

It is also noteworthy that tropical heights of 1500-2000 m. are climatically equal to sub-tropical districts.

If acclimatisation in the tropics is to be possible, it is essential that the individuals concerned should be in perfect health

¹VII. International Congress of Hygiene.

with normal hearts and undisturbed digestive functions. As to the foundation of families we have already seen what advantages accrue from intermixture with indigenous inhabitants or with such races which become acclimatised with greater ease. An occasional return to places in the temperate zone is of great value to the individual welfare, and equally advantageous for the propagation of a strong and healthy progeny is a frequent addition of fresh European blood by marriage with newly-arrived emigrants.

Favoured colonies.—The European emigrant has mainly made his way to such tropical countries with which the mother-country is in special relations either as former or present colonial possessions, or on account of the commercial intercourse or community of language. Hygienic advantages or disadvantages have generally received less consideration. But experience has shown that certain tropical countries are suitable for permanent colonisation, above all, most of the elevated places such f. i. as the Andes highlands in South America, the Mexican highlands, the high table-land of Abyssinia, the Himalaya Mountains and their forerunning chains in India, etc.; there also are some limited localities, even in the neighbourhood of flat coast-lands, or small islands at some little distance from the main shore which present on account of their exposed situation and abundant air-currents, better hygienic conditions and freedom from malaria. Further, there are some insular regions, f. i. among the Polynesian group the Sandwich, and Fidji island, which bear a good sanitary reputation; similarly St. Helena and the Cape Verde islands, whilst the portion of the African continent lying opposite to them, Senegambia and Upper Guinea, are notoriously unhealthy.

Particularly suitable from an hygienic point of view is, to all appearances, Queensland and even its territories extending right into the tropics.

The European immigrants, English, German and Dutch, have since the discovery of that colony by Cook in 1770, multiplied steadily. Thriving towns have sprung up in which there is an European-like traffic. Agriculture and mining are in full swing. The native

Australian races have been pushed into the interior. The public health is excellent; the towns are free from malaria and in the rural districts this disease is very rare; the reason may possibly lie in the peculiar vegetation of the open eucalyptus forests which permit the heat from the soil to escape easily during the night. There are cool nights; the seasons are distinct. There are no swamps.—The Europeans born in the country have developed well and for a century Germanic tribes have reproduced themselves, although they do not exactly live under a highland climate. (*Schellong*.)

For a description of the climatic conditions of the German colonies, the reader is referred to *Plehn's*¹ lectures.

The climate of Kameroun is characterised by an equable oppressive heat without considerable variations in the mean monthly temperatures, by copious discharges with great humidity of the air and very uniform winds, conditions which prevail in the West-African low-lands generally. The mean yearly temperature is about 25.4° C. and the humidity of the air very great, 88% on an average, rising to 92%. The northern part has only one rainy season, from April to October, shortly before and after easterly winds of extraordinary violence rage; then follows the dry season. In the south of the colony this marked difference is no longer noticeable. During the day there are sea-breezes coming from the West, and at night land-breezes from the East.—What makes the Kameroun low-land climate so hard to endure is the almost entire absence of marked differences in the temperature while the air is at the same time almost absolutely saturated with vapour. There is here in opposition to German East-Africa no season of the year during which real recuperation is possible; even in the coolest nights the temperature goes down but very rarely below 20°. More favourable conditions are offered by the mountains rising from the low-lands, and

¹Tropenhygiene mit spez. Berücksichtigung der deutschen Kolonien 1902.

by the high table-land which constitute by far the greatest portion of the colony, but which has so far been very little utilised for colonisation purposes.

Togo which lies in close proximity has an average temperature of 26.5, two rainy seasons, from March to June and from September to November; between November and March there are dry winds blowing from the desert and which are known by the name of Hermattan.

The South-West-African colony belongs in its northern part which forms $\frac{2}{3}$ of its extent to the tropical zone proper; the southern part is situated in the Cape region. It is noteworthy that the colony is extraordinarily poor in water. The coast-land is comparatively cool on account of the cold ocean-current which rises in this part of Africa from the South Polar sea and from which there are always keen south-west winds blowing landwards. The daily variation in the temperature is consequently very slight. The monthly average in Walfisch Bay is 14-17°, the seasonal variations 13.3-20.5°, the absolute extremes 38° and 3°.—The high table-land of the interior has in spite of its considerable elevation a higher temperature than the coast on account of the absence of the influence of the sea. The changes in the temperature are very considerable, the humidity of the air is very great, and the yearly temperature fluctuates between 14° and 19°. In the interior of the colony the differences in the temperature are considerable; in Omaruru there have been observed such extremes as 38° and 4°.—German West-Africa has generally speaking a climate which Europeans can bear well.

German West-Africa has, like Kameroon, a flat coastland and highlands in the interior; it has very much less rain and its vegetation is therefore far less luxuriant. In the northern equatorial coast-region the mean annual temperature is about 25-26°; and there are two distinct rainy seasons, between March and

May, and in November. The south part of the colony has only one rainy season, from the middle of November to the middle of May.—The rainfall is generally less than in Kameroon, and the rains less certain. The humidity of the air at the coast amounts to 80-86%.—At the beginning of the year the coast-land is under the influence of the north-east monsoon coming with great force from the Asiatic continent over the Indian Ocean, which blows night and day as a warm wind causing often at night unbearable sultriness. It lasts until May. The wind veers round slowly towards south-east, gains in intensity, and has a strong current-movement directed towards the very hot Sahara; this is the beginning of the coolest and most endurable time of the year. The country near the coast which is situated at an elevation of 1000 m presents extraordinarily favourable climatic and hygienic conditions; the same may be said with regard probably to large tracts in the interior which have not however as yet been sufficiently explored in these directions.

New-Guinea also has, like Kameroon, on its coast very thick forests which stretch up to a considerable height as far as the mountains some of which are close on 4000 m. high and are situated to a great extent near the sea. Under the influence of the forest there is an extremely uniform sea-climate. As mean temperatures we can take 26.1° in the North, and 26.9° in the South. The differences between the coldest and warmest months are extremely slight; the average fluctuation of the daily temperature amounts to about 8° . As regards rainy seasons and rainfall, there exist very great differences according to the local conditions and especially according to the situation of the high mountains in respect to the direction of the trade-winds. Like everywhere else, the climate on the mountains is particularly agreeable.

The Bismarck-Archipelago, the Marshall-islands, the Samoa-group, the newest colonial acquisitions in the

South Sea, the Carolines and Ladrões possess an equable, humid, warm climate without perceptible daily or monthly variations, moderate eastern air-currents interrupted by occasional storms and copious, fairly generally distributed discharges.

PART II

Sexual maturity.—The duration of human life is like the seasons of the year, sub-divided in four periods. With the commencing development of the sexual maturity the individual ceases to be a child, and as every organic formation takes place slowly, the process of puberty in both sexes is also a slow one and fluctuating according to the time.

Menstruation.—The period of menstruation which in Germany begins as a rule at the commencement of the 15th year depends upon various circumstances so that considerable modifications occur in different places. The influence of race, climate, nutrition, mode of life, growth, employment, bringing-up, habitation, dress, customs, sensuousness and physical life is well-known, and to these may perhaps be added as a determining factor the hereditary predisposition.

Commencement of the same.—As a general principle it may be said that the more southern the home of a nation the earlier puberty makes its appearance. In the tropics sexual maturity begins between the age of 11 and 14, in our latitudes between 13 and 16 and in the north between 15 and 18. But Polar people also acquire maturity at an early age. Hitherto this has been observed principally in the Eskimos. Among the Samojedes it is also by no means an unheard-of thing to come across married women of 13 years of age. A physiological explanation why puberty should commence sooner the nearer a people are to the Equator or to the North Pole is not as yet forthcoming.

Those who have studied the question regard climate as the

chief cause of the variations. But it is hardly yet possible to distinguish which of the elements constituting a climate, namely mean yearly temperature, geographical longitude and latitude, elevation above the level of the sea, proximity of the sea, etc., claims the preponderating influence, if any, in the matter, and to what extent. Race is probably also an important factor with regard to the commencement of menstruation, but it is difficult to define that importance. (*Krieger.*)

(It is said that in the arctic regions the quantity of the menstrual blood is extraordinarily small, and that the Eskimo women menstruate only in the summer time and then only to an insignificant extent; on the other hand menstruation in the tropics is very profuse. In our climate the quantity of the menstrual blood is estimated by various authors between 100-250 grammes.)

The influence exerted on the appearance of menstruation by a luxurious and comfortable mode of life and also by an indulgent bringing-up may be seen from the calculation of *Brierre de Boismont* for Paris which shows an average age of 14 years and 4 months, whereas in women belonging to the middle-classes menstruation begins with 15 years and 2 months, in working-women with 15 years and 10 months and in servant-girls with 16 years and 2 months.

Experience has shown that generally women begin to menstruate later in country districts than in towns; the difference is sometimes as much as 6 months or a year. It is believed that town-women acquire the earlier maturity in consequence of the more intensive excitements to which they are subjected.

The figures given by some authors may be quoted here: According to *Tilt*, Indian women menstruate in Calcutta (at 11 years and 11 months) sooner than Negresses in Jamaica (14 years and 10 months), and Eskimo women in Labrador (15 years 3 months) sooner than Danes and Norwegians (16 years). *Joachim* found in Hungary the average age of puberty: 16-17 in Slovak girls, 15-16 in Magyars, and 13-14 in Jewesses. *Vogt* gives for Norway 16-17 years in Laplanders, and 15.2 in Kwain-women. Fre-

quent variations occur round these average figures. *Litzmann* says that in Smyrna one sees mothers 11 years old; in the North of Persia the signs of female fruitfulness appear with the 13th year, and in the South already between the 9th and 10th year; in Eboë on the coast of Guinea between the 8th and 9th year.¹

The average age at which young girls begin to menstruate in non-European countries is 13 in Palestine, 13-14 in the Singalese of Ceylon, 12-18 in Siam, 16 in China, 15-16 in Japan, 14 in the East-Indian Archipelago, 11-13 in the tropical and sub-tropical parts of South-America.

End of the same.—Where the natural desire appears precociously early, it also disappears sooner, and the productiveness of the female body ceases completely at the 30th and often already at the 25th year. *Tacitus* certainly uttered a true experience in ascribing the prolonged youth of the Germans to their late marriages.

As regards our temperate climate, and under regular circumstances, we may say that menstruation ceases between the 45th and 50th year, though there is little precision about it, and that the menstruating life lasts therefore from 30 to 35 years.

Experience teaches, according to *Scanzoni*, that women who begin to menstruate at a very early age, f. i. at the age of 10 or 11, generally enter the climacteric earlier than others, so that the menopause occurs at 40 or 42. On the other hand others maintain the contrary, namely that women whose menstruation commences later in life reach the climacteric very early, and that those who begin to menstruate very early continue to do so until a comparatively advanced age.

Certain observations seem to favour the view that among the lower classes menstruation ceases sooner than in the upper.

Mantegazza has established climatic differences for Italy in the sense that the cessation of menstruation occurs in North Italy between the ages of 44 and 46,

¹*Hensen*, Hermann's Handbuch d. Physiologie, Vol. VI.

and in Central Italy between 45 and 47; in the South it falls as a rule in the 45th year, but it may be delayed to the 50th or 60th year.

Early marriage especially before complete maturity, generally results, as experience shows, in early decay. The women in Bosnia and Herzegovina begin, according to *Roszkiewicz*, to look old when they are 35 years of age; *Tuke* mentions that the Maori women when 25 or 30 years old appear more like 40 or 50; the cause of their premature decay probably lies in the early beginning of their sexual life. In Chinese women menstruation lasts, according to *Mondière*, at the utmost till they are 40 years old, in the Japanese it goes on, according to *Wernich*, until the end of the fourth decade. *Kögel* says that the custom of early marriages in Java accounts for the circumstance that Javanese women do not become pregnant after the age of 35, and *Finke* reports that Banganese women cease to conceive at the age of 20.

A frequent phenomenon after the cessation of menstruation in matronly women is the accumulation of adipose tissue in all parts of the body, which sometimes assumes extraordinary dimensions. In consequence of the gradually relaxing and more expansible state of the connective tissue the adiposity tends in contrast to the elastic condition in young women to form depressions and wrinkles.

Duration of sexual maturity in the male sex.

The commencement of puberty cannot be ascertained in man so accurately as in woman; it is assumed that the former becomes sexually mature about one year later than the latter. The development of the testicles occasions as circumstances show, an intensive growth in certain definite parts of the male body. The most noticeable external sign consists of an alteration in the voice; the beard and pubic hair begin to sprout; the bones and muscles become stronger and the generative organs receive their complete development. The rule that the beauty of mammalian male animals lies in their full bodily strength applies therefore to man as well.

As in the female sex so in the male the signs of puberty show themselves in hot countries at an earlier age; in Egypt, f. i. according to *Hartman* in boys of between 11 and 15.

The prematurity of the male youth in the tropics is accountable for the very early commencement of sexual intercourse. The unrestricted social customs of many non-European countries afford most varied opportunities so that young men of 16 or 17 are in the habit of regularly gratifying their sexual desires.

In the advanced age of the man the process of sperm-formation retrogrades gradually. According to *Duplay* and *Dieu* the number of normal spermatozoa in the epididymis diminishes, but on the other hand there are many misshapen ones, especially with deficient tails.

Semen to a certain extent normal is occasionally found in very old men, but the generative faculty begins as a rule to decline in the 60th year; frequently the offspring of advanced age are imperfect.

(Of 165 old men those between the ages of 60 and 70, showed 65.8% with production of semen; those between 70 and 80, 59.5%, and those between 80 and 90, 48%.)

Marriageable age.—Law and custom have regulated the marriageable age. As a rule we may say that the lower the grade of social civilisation of a people the earlier the age at which its girls are allowed to marry. Improved customs raise the regard for, and the value of, woman; moreover the fact that among civilised nations marriage renders the creation and support of a separate household necessary, contributes materially to its postponement.¹

Whilst *Lycurgus* forbade all young Greeks to marry before attaining the age of 37, *Plato* demanded for men the marriageable age of 30, and for women 20. Under the Emperors of Rome the completed 12th year was considered as a sufficient majority for marriage, but

¹*Ploss-Bartels*: Das Weib in der Natur- und Völkerkunde, 1898.—*Peschl*: Völkerkunde, 1885.—*Johannes Ranke*: Der Mensch, 1894.—*Ratzel*: Völkerkunde, 1895.

there are proofs that girls married when they were only 11 years old.

The less civilised European nations, especially those in the South, have not yet discontinued their custom to marry their girls very early. Among the Ricas, a tribe of the southern Albanians, girls marry at least when they are 12 and boys when they are 15, and yet these premature marriages do not seem to impair at all the really athletic form of this type of humanity. It is however to be remembered that Albanian women are considered fully mature at the age of 12. Among modern Greeks on the other hand sexual maturity does not occur before the age of 14 or 15 in females and 16 or 17 in males. The Ruthenians in Hungary are also in the habit of giving their girls in marriage when 12 years old, and of the southern Slavs it is reported that as a rule their women marry when they have completed their 16th year and their breasts begin to swell.

The legislation of all civilised States has proceeded from the point of view that it is necessary to obviate arbitrary decisions, injurious to the community, by definite legal enactments. Naturally it was the Church first that interfered in questions relating to marriage, and canon-law fixed the marriageable age for boys at 14 and for girls at 12. An analogous regulation is found in the middle-ages in the Longobardian, Frisian, and Saxon laws and also in the "Schwabenspiegel" (a south-German code of laws founded on the "Sachsenspiegel"). The present-day German law fixes as the minimum age for men 20, and for women 16. For the whole of Russia there is a law in force which prohibits under pain of transportation to Siberia marriage with a girl under 16 years of age.

Youthful marriages are uncommonly frequent among extra-European nations. Not without influence on the custom of early marriages in the East are probably the religious institutions which act in association with the climatic causes. Marriage is one of the religious duties of Mahometanism and Mahometan girls are permitted to marry when 10 years old.

Oppenheim says with regard to Turkish women that they menstruate at the age of 10, marry at 12, become soon mothers, are very prolific, cease to menstruate at 20, grow old and decay very early.—*Klunzinger* reports that in Upper Egypt boys of 15 to 18 marry girls of 12 to 14, and adds significantly that these marriages which are in our estimation premature are moreover to the extent of about two thirds entered into between cousins without showing any ill-effects upon their fruitfulness. With the Chinese it is customary though not legally enacted for girls not to marry before they are 15 but to wait as a rule till they are 16, and for men not before they are 20. In Japan the marriageable age was up to recently in men 16 and in women 13. In North Polynesia, in the Hawaian Archipelago, girls are said to be ripe for marriage in their 8th year, but they may not marry before they are 14.—Among the negroes in Africa marriages also take place early, and mothers 14 years old are no rarity. *Erman* has recently recalled the circumstance that in the Aleutian island Atcha boys may marry as soon as they can drive a "baidare" (a vehicle) and girls when they can sew properly, that is generally in both about the 10th year.

Numerical proportion of both sexes.—Nature looks to it that there shall be as many men as women and provides approximately one woman for every man. Among civilised nations it is proved that there is an excess of male births.

A report of the statistical office of the Italian Minister for Agriculture on the proportion of male to female births for a period of 19 years and with respect to 32 countries shows that there are constantly 105 boys born to every 100 girls.

In Europe the female sex shows in the first periods of life a markedly smaller mortality than the male; moreover, the shorter duration of life in men is a widely spread phenomenon which is to some extent easily explained. On this account there is in the later periods of life an alteration in the original pro-

portion to the disadvantage of the male sex. The entire population of Europe shows therefore a predominance of women over men so that there are 102.1 of the former to 100 of the latter. But this does not apply to all countries in the world, for some show exactly the reverse. In the proportion of women to men there is also a racial element at work; on the whole there are in Europe more men than women among the Latin and South Slavonic nations, and more women than men among the Teutonic and North Slavonic peoples.

But human customs and practices as well as influences whose nature we do not quite comprehend as yet, do their utmost to alter this proportion. Economic and political measures tend sometimes and in some places to increase the number of one sex over the other as f. i. emigration, military requirements, etc.

Monogamy always acts compensatingly to a certain extent, and re-establishes the balance in a comparatively short time, where it is disturbed as for instance in newly-opened countries through the overwhelming immigration of men. On the other hand polygamy is supposed to be mainly responsible in uncultured nations for the disturbance in the numerical equality of the sexes and for the dangerous fluctuations of the population.

In nations of a low type which constantly struggle against misery, the number of women is apparently far behind that of the men. According to the census of 1881 the natives in the South Australian colony numbered 5628 individuals of whom 2430 were women; of the 883 children only 405 were females. The infanticide prevalent among such tribes generally affects more the weaker sex, and its surviving members suffer too much from the greater share of hardships which falls to the lot of the women-folk of wandering nations.

Where a population is declining it seems that the female portion disappears more rapidly than the male. Such nations are generally warlike; the loss of a woman is therefore no loss to them. Single women are allowed to perish unmercifully. The harder the struggle for existence the greater the necessity of the weaker sex to

seek the companionship of the stronger one; this is the reason why in such countries as Greenland single women find it impossible to exist long without male children.

One of the characteristics of the colonies is the smaller number of women, because women emigrate as a rule less than men. Migrations disturb the progress of a population; in the emigrant countries more women remain behind, in the immigrant a preponderance of men is formed. An excess of women over men is present among nations in all states of civilisation whose male half has been reduced by war or emigration.

The state of unrest of many nations which are in a barbarous condition is not favourable to the growth of the female element. There are large emigrations as f. i. those of the Chinese to the shores of the Pacific Ocean and to the West-Indies in which the female sex is not represented by as much as 1%. In British Guiana there are in spite of the regulated emigration of Indians only about 10,000 coolie-women to 30,000 men.

Polygamy causes in some tribes the number of women to increase, in others to decrease. A more just sub-division of property, such as is claimed by some in other directions, has in any case been attained with regard to women by the system of monogamy which prevents an accumulation of women in the hands of rich individuals and especially in those of heads of State. In so far as civilisation depends upon the steady and regular growth of nations it owes this blessing to the decline of polygamy. Wherever the latter prevails,—and all uncultured nations are formally or practically polygamous,—the women are unequally divided and the number of births diminishes. Many men go without women even where the latter are greatly in excess as f. i. in Uganda; a few know how to obtain a great number. But these are not able to make up for the loss in births caused by the compulsory celibacy of so many others. *Malthus* already knew that in Turkey the monogamous marriages of the Christians were more productive than the polygamy of the Turks. This assertion has recently been amply confirmed by modern investigators.

The necessity to work acts regulatively on these conditions.

Where the natives are in regular employment their physical well-being and their favourable social relations are evident.

Baelz says that the infantile mortality among the working populace of Japan is low, whereas it is high among the decrepit higher ranks. Although polygamy is legally permitted in China and Japan it has fortunately for them never become so universal there as in other countries.

Special marriage-forms.—Marriages are called polygamous or polyandrous according as the household is conducted by one man with several wives, or where one woman belongs to several husbands at the same time. Polygamy is prevalent all over Africa; it was also permitted by almost all Asiatic nations; in America on the other hand it is seldom met with.

There is an often quoted statement to the effect that in polygamy female births preponderate and that Nature adapts herself so to speak to the locally prevailing marriage-customs. This is however doubted and credible observers have testified that boys and girls are born in the harems in exactly the same proportions as under monogamous circumstances.

Breeders of animals assert that in race-horses, greyhounds and Cochinchina fowls the proportion of the sexes in births remains undisturbed though the strictest polygamy is employed in these animals. (*Darwin.*)

Genuine polyandry is seen among the tribes which form a transition between Asiatics and Americans, namely among the Eskimos, the Aleutians, the Konjacks, the Koljuschis, in whom other sexual aberrations are also not wanting; also among the Maoris of New-Zealand, and among some tribes of the southern Malabar coast and the Nilgiri mountains, and in Ceylon.

Origin of marriage.—*Lubbock* maintains that early man did not practice nuptial cohabitation and that the women were common property of all the male members of the tribe. He describes the condition as hetarism. The majority of ethnographers and anthropologists do not share this opinion; there

may have been mistakes in the interpretation of certain forms of marriage and of the influence of local barbarism. The view that pre-historic man did not know what marriage is seems incredible, as we find even in animals a sort of strict pairing; *Darwin*¹ also has denied the probability of a common property in women.

Adolf Bastian in a lecture before the Berlin Anthropological Society has expressed most admirably his views on the development of the different forms of marriage, in which the conditions of Matriarchate and Patriarchate play a very important part. There is no question in the former of any privileges attached to the female sex, but rather the profoundest contempt such as the strong always have for the weak where might is right. In the primary horde it would have been the physically and morally strongest men who appropriated the women first and naturally they would select the younger and most attractive ones. With the arrival of offspring the father would decline all further obligations, and the latter would devolve entirely upon the mother.

A transition to patriarchate is occasioned by the sympathy springing up in the father's breast for the children of his flesh and blood, though perhaps only on account of the assistance which they might render him in his agricultural pursuits associated with a more settled mode of life, and because it would be a disadvantage to forego this assistance.

Consanguinity.—In many tribes we meet with the custom that the closest relationship is not only no obstacle against marriage but rather an additional advantage, and on the other hand we see in others that such marriages are prohibited not only between close blood-relations but also between persons whom we should at the present day hardly regard as relations at all, f. i. foster-brother and foster-sister. In civilised countries definite laws have been passed regulating the degrees of relationship which act as impediments to marriage, but the laws of the different States differ materially from one another. The hereditary influence of consanguineous marriages upon the

¹Descent of Man, Vol. II, p. 358.

offspring is of great importance to the hygiene of marriage and for this reason specially dealt with in a separate chapter of this treatise.

Infantile marriages.—A brief reference to marriages between children is here indicated. Very few nations practise the habit of marrying their children when they are very young—between 4 and 9 years—, but the age of 10 or 12 is a very prevalent marrying age. Such early marriages do not of course mean in every case an immediate commencement of sexual intercourse. Among the Chinese *f. i.* the marriage contract is often concluded when the girl is only 6 years old, and the young wife enters the household of her husband; but the consummation of the marriage does not take place before the girl is at least 12 or 13, when as a matter of fact she is already fully developed. To our regret we hear that Europeans in Celebes are in the habit of keeping concubines of the age of 12 or 13, and the custom is so general there that no one seems to find fault with it. India is always spoken of as the classical land of child-marriages. On account of the numerous physical injuries which these children suffer in their marital intercourse, an agitation is at present on foot to abolish by law this institution so horrible to the feelings of every humanitarian. There are cases where some of the poor creatures have become mothers without ever having menstruated. It is astonishing to hear that the child-birth of such young mothers often takes place without any injury, though many of them do lose their lives.

It seems to be an established fact that premature sexual intercourse is capable of hastening the first appearance of menstruation; experiments which *Coste* has made on rabbits also seem to show that irritation of the genital organs can expedite the maturation of the ova and their separation from the ovaries.

Premature senility and an early extinction of the conceptive faculty are said by many authors to be a direct consequence of infantile marriages. (*Ploss-Bartels.*)

Beauty of female sex.—The consideration of the beauty of women from the æsthetic point of view is the concern of the artist. The scientist's demand is that the female

body shall be so constituted in all its parts as to be fully equal to the sexual functions of the female sex.

Climatic and different other external circumstances are as a rule of decisive influence, sometimes beneficial and sometimes injurious, upon the physical and moral development of human nature in general, and the female sex especially. The position of woman in the social life and the activity allotted to her by convention among all nations contribute to the more or less beautiful development of the female form. Among uncultured people in their state of naturalness, among stunted tribes with primitive customs the contrast between man and woman is not pronounced but rather obscure. With the growth of civilisation it becomes clearer and clearer and it advances step by step. Rural populations living in a secluded state, and proletarians constantly bowed under the yoke of hard manual labour exhibit in both sexes almost the same physiognomy (*Riehl*). Among civilised nations living in comfort, beauty and nobility of features progress from generation to generation along with the mental improvement, though nature does like occasionally to create beautiful female types under the most unfavourable external circumstances and among nations in a low state of culture.¹

Cordier said in a thesis laid before the Anthropological Society of Paris: Beauty is not at all the property of one race or another. Each race differs as regards its own beauty from the other races. Rules of beauty are therefore not general, they must be studied specially for each race.

Although the conception of beauty is uncommonly different among the different races and nations, it becomes in the male suitors an unconscious cause in the selection of their breeding-partners. *Darwin* maintains that women transmit their beauty to their female children to a greater extent than to their male offspring; and for this reason women have gradually become more beautiful than men.

¹*Ploss-Bartels*. See also *Stratz*, "Rassenschönheit des Weibes" 1901, and "Schönheit des weiblichen Körpers" 1900.

Through the mixture of races the female beauty gains in quality, but it is not yet known which peculiarities of the father or mother are of greater influence on the products of the race-mixture.

Nations which intermarry only within their own race create descendants who exhibit most markedly the characteristics of that race. Intermixture with other races produces by hereditary transmission in the offspring either paternal or maternal peculiarities.

There are thousands of ethnographical proofs. If a negro mixes with an Egyptian woman, the children have yet the hair of the negro race, but the grandchildren's hair is already smooth and they resemble the Egyptians. Europeans and Turks procreate with Abyssinian women children who approximate in their physical type Spaniards and Portuguese. The cross-products of Javanese and Europeans are strikingly good-looking; they have neither the turned-up nose of the Malay nor the big smiling mouth and the narrow eyes. *Finsch* saw a two-year-old child of a white man by a woman from New-Guinea which looked like a sun-burnt European child with curly fair hair, dark eyes and red lips. An interesting type is that of the mulatto-woman, a product of the union between a white man and a negress, on account of her slender build, delicate hands, rounded breasts, tall stature, small and dainty feet, and all this associated as a rule with a frolicsome disposition.

A universal admission as to the representative of which race or mixture of races deserves the first beauty-prize has as yet not been possible to obtain nor is it likely that one will ever be obtained, seeing that opinions on the subject of beauty are as different as the conceptions of beauty-ideals.

Mixture of races.—The definition of "kind" by *Decandolle* is that "it is the union of all single individuals who resemble each other more than others, and whose sexual intercourse produces fruitful descendants who in their turn also renew themselves by succeeding generations."

Flourens was also of the opinion that fruitfulness establishes the permanency of peculiarities; different kinds produce however cross-products of limited fruitfulness only.

It was formerly believed that the offspring of different human races possess no fruitfulness. But this is by no means the case. Even in the breeding of animals it is seen that those which avoid each other sexually when in a state of freedom can be brought together for the purpose of mixing their blood and characteristics. It has never been denied that Aryan Hindus can produce mixed descendants by Dravidas, and that these descendants are in their turn capable of reproduction; the same may be said of Chinese with European women, and of Arabs with negresses. It is however frequently said that mulattoes do not survive many generations. The women of mixed blood in Central-America are also said to be sterile as a rule. But the cause of this certainly frequent occurrence is by no means a physiological one. It is due rather to immoral life and early excesses. On the other hand mulatto-women of every imaginable prolificness are by no means rare. The fact that on the island of Cuba and in Hayti half-blooded populations have grown up in hundreds of thousands is at least sufficient proof that the descendants of South-European Creoles and Negroes are reproductive. Complete sterility of the Anglo-Saxon mulattoes in Jamaica has only been observed temporarily and is even contradicted altogether. A further mixed race in America are the Sambos, descendants of Negroes by women belonging to the so-called red aborigines. They are often seen among the Creek-Indians in the United States, and also in Central America and the inhabitants of the coasts of Panama and Columbia bear decided marks of half-African blood. In the countries which were formerly Spanish colonies there are millions of cross-products by Europeans and native American women known under the generic name of *Mestees*. In South America there is a large population of mixed offspring of Negroes and Portuguese, in Chili one of Indians and Spaniards; in other parts of this continent there are the most complicated mixtures between Indians, Negroes and Whites, but it is just this triple admixture which supplies the strongest proof of the reciprocal fruitful-

ness of different races. The mixed race in Paraguay surpasses even in fruitfulness the two races from which they have sprung. An extraordinary reproductive faculty is witnessed in the mulattoes who are very plentiful in the European colonies as well as in the States of South America. The reason why there are so few mixed people in Australia is, as shown by judicial investigation, to be found in the fact that the natives are in the habit of killing their impure children. (*Darwin.*) Tasmanian women have also brought into the world numerous cross-products. Of greater importance still is the circumstance that half-blooded individuals have resulted from unions between Europeans and Hottentots, for if there is any type of humanity which may claim to be regarded as a special kind it is surely these aborigines of the Cape-countries.

These cross-products are called in their own country partly bastards, and partly Griquas; this last term has however been misused so much that it does not convey any longer a restricted anthropological meaning. (*Fritsch.*)—Finally there have been many kinds of intermixture between British, Dutch, Mulattoes, and Negroes in out-of-the-way islands, such as Tristan d'Acunha.—*Le Vaillant* says: Hottentots produce when they marry among themselves 3 or 4 children; when they unite with Negroes this number is trebled and it becomes even higher when they intermix with Whites.

The colour of the skin alters rapidly by the mixture of Europeans with brown-yellow South-African women; this does not take place so quickly where negroes mix with European women, the negro-blood comes to the surface in such cases even in later generations. The descendants of Europeans by coloured native women are called Creoles in such extra-European countries as were formerly Spanish, French or Portuguese colonies, the offspring of Europeans by Indian women are called Mestees (in Mexico also Ladinos, in Ecuador, Peru and Chili also Cholos), those of Europeans or Creoles by negresses are called Mulattoes, and those of Indians by negresses, Sambos or Chinos.

Where mulattoes intermix with whites the negro-blood is indicated in the subsequent generations by fractions: a terceroon is the offspring of an European by a mulatto-woman, a quadroon one by a terceroon, and so on from quintroon to octoroon. The quintroon is hardly in any way different from a white, and even before the abolition of slavery in the United States he was already regarded by law as a white. While the mulatto is still very much like a negro, the individuals possessing less negro-blood show yet the violet colour of the nails and a bluish ring around the eyes as characteristic signs, and these are the last to disappear. Vice-versa, if mulattoes mix with negroes, the white blood becomes quite extinct again in the 4th or 5th generation. The success of intermixture is however by no means regular or calculable beforehand. Just as among ourselves the union between fair-complexioned and dark people is not always productive of intermediate stages between the two types but sometimes of fair children and sometimes of dark, so the offspring of marriages between whites and coloured people may incline either to the one type or the other.

Even in later generations there is often a reversion to an ancestral link. With regard to the mixture of races between Whites and Kaffirs *Fritsch* says: The behaviour of the colour in the skin of the cross-products is very singular, and it is difficult to lay down any laws. What is certain is that such persons have often a strikingly dark skin which is as far as strength is concerned not one whit behind that of the pure race, and also that later generations have a tendency to atavism, inasmuch as the grandchildren are more like their grandfathers than the great-grandchildren.

The very light mixed race of Europeans and Hindus is known as Eurasians or Australasians; they are very numerous and politically of great influence in their country.

Marriage in the tropics from the medical point of view.—The hygienic advantages of marriage and of a household of one's own are for the male inhabitants of the tropics of particular importance; a regulated mode of life, suitable nourishment, a healthy home, and similar other

necessities are often very hard to obtain otherwise under tropical conditions. Many a promising career has been shattered through the impossibility of finding the necessary domestic comfort for the preservation of health under circumstances of an exhausting nature. And what a blessing it is to have a wife when sickness demands careful and intelligent nursing! It is more correct to say that it is in the tropics where both doctor and patient experience the want of the external conditions created by the married state. Some of the objections which Europeans in the tropics have against marriage from their point of view and from that of the eventual offspring are often practically disposed of by having recourse to concubinage.

Though we must bear in mind the unfavourable climatic influences on the female sex, it would nevertheless be a mistake to condemn on principle the marriage of every European in the tropics. As in everything else where medical advice is needed it behoves us to consider each case on its individual merits.

We cannot enter here into a discussion how far the relations between the various diseases and marriage with respect to climate and race present special features. It is for the first time that this subject is dealt with in this work by specialists in a comprehensive manner. It must be left to some future occasion to give my own experiences and those of others on the basis of the above mentioned relations. For the present I must confine myself to the mention of the geographical distribution of the two diseases which are as is well known, of the greatest importance to marriage and the offspring resulting from it, namely syphilis and tuberculosis.

Distribution of syphilis.—*Scheube* (Archiv f. Schiffs- und Tropenhygiene 1902) has instituted a general investigation on a large scale and ascertained by means of it that syphilis has become almost universally prevalent in tropical and sub-tropical countries. There are only a few isolated places not yet open to the commerce of the world, in Further India, on the Dutch-India islands, in Luzon, in the heart of Africa, in New-Guinea, and the island-groups of the South Sea, in the furthest interior of Brazil, whose inhabitants are as yet free from the ravages of this dreadful scourge. It is unfortunately

an incontrovertible fact that the carriers of civilisation have in newly opened-up countries introduced along with the blessings of culture the curse of syphilis. Wherever discoverers, conquerors, explorers, sea-farers and merchants have made their appearance syphilis was not long in following close at their heels and in infecting countries which were before as clear of it as they were of every vestige of civilisation; like a merchandise, as *Mense* says, syphilis spreads by stages from tribe to tribe.

Though syphilis is present in all warm countries with few exceptions, its distribution in the same is an unequal one. Of the greatest influence on the latter is the purity or laxity of the morals reigning among the inhabitants, and particularly the extent which prostitution has attained. The more freely and unrestrictedly prostitution goes on in a country the greater as a rule the prevalence of syphilis.

Seaumanoir (Arch. de méd. navale 1890) says it is generally well-known that in the Sandwich-Islands almost the entire native population is affected with syphilis. *v. Düring Pascha* estimates that syphilis is largely and equally distributed in Turkey and Asia Minor among all races, Circassians, Kurds, Tartars, Turkomans, Arabs, Christians and Mahometans.—In Burmah after the abolition of the control of prostitutes the percentage of venereally-diseased in the British army rose from 155 to 376 per thousand. Acquired syphilis is very often seen among the native Eurasian school-boys under 16 years of age. In Siam at least 70-80% of the male European population are affected, and among the Siamese it is a rare thing to come across a man even if belonging to the highest circles who has not had syphilis.

The most severely afflicted localities in Asia are the earliest habitations of the disease, India, China and Japan. In the Dutch army syphilis is present about four times as often among the Europeans as among the natives, most of whom are married.

The inhabitants of the African coasts are severely affected, probably through infection from Europe,

whilst Central Africa suffers to a comparatively mild extent only. On the East coast of the African continent and on the East African islands the number of syphilis is estimated at $\frac{5}{6}$ of the whole native population. In Durban (Natal) syphilis exists among all classes of society. The frequency dates however from the discovery of the gold-mines which have attracted prostitutes from all parts of the world. In Windhoek (German West Africa) half the number of Hottentots and mixed products applying for medical treatment suffer from syphilis.—In Kaiser Wilhelm's Land (New Guinea) syphilis was according to the unanimous opinion of explorers unknown before Europeans settled among the native Papuans. The latter are very particular in not permitting their women to have sexual intercourse with white men. Soft chancre and gonorrhœa are also said to be unknown there.

In the Bismarck Archipelago where the native women are easily procurable gonorrhœa has become very frequent among the natives, and syphilis which was there also unknown must by now be quite a common occurrence.

It would be possible to continue this selection also with reference to the American Continent.

This general prevalence of syphilis is naturally not without influence on the public health and on the relation between births, miscarriages and deaths, and it often represents an important cause of the constant decline of the native population observed in some localities.

Generally speaking the course of syphilis in the case of Europeans is the same in the tropics as in Europe, but in the case of the natives it is as a rule more rapid. The primary lesions are often not noticed, the secondary eruptions are very transitory or absent altogether, the maculous syphilides are not recognised on the coloured skin, and tertiary symptoms make their appearance very early. The reason why the contagion is so severe among the inhabitants of tropical regions is probably because the hygienic surroundings of the natives leave

very much to be desired and because a rational treatment of the disease is unknown.

It was formerly believed that the negro race is immune against syphilis. *Livingstone* who in the middle of the last century found Bechuanaland as yet free from the disease whilst among the mixed races of the Korans and Griquas it was as prevalent as in Europe, made the assertion that syphilis does not attack the full-blooded negro, and that it appears the more frequently in mixed races the more European blood flows in their veins. Circumstances have however materially changed since then in Africa. Syphilis has with the increase of trade in the last 50 years made enormous progress in the dark continent, and even the natives of Bechuanaland who were at one time quite free from the disease suffer from it now to a very great extent.

Gonorrhœa has a universal distribution, but is hardly in any way different in different races and climates than it is in Europe, both in its form and its consequences. It is often maintained that gonorrhœa is mild in the tropics; other observers think it is more virulent; on principle such a differentiation is not justified. It is probably the attention given to the disease and the manner of its treatment which constitute the principal factors that determine the course of gonorrhœa; the same may be said with regard to the dietetic observance, particularly the abuse of alcohol.¹

Distribution of tuberculosis.—It is well known that tuberculosis is prevalent all over Europe.² It is only in a few places and under special circumstances that a deviation from the generally high mortality-figure occurs. It is reported f. i. that the disease is rare in the North-West European islands, in Iceland, Faroe, the Shetlands, the Hebrides, and in the North

¹Translator's note: I was recently informed by two gentlemen from South America whom I treated for post-gonorrhœal stricture that this sequela is exceedingly frequent there on account of the very strong remedial injections employed.

²*Hirsch*, Handbuch d. histor.-geogr. Pathol., 1886.—*Herm. Weber*, Münch. med. Woch., 1891.

of Norway; it is also said that Cyprus is almost free from tuberculosis.

In the United States of America tuberculosis is as prevalent as in Europe. The women show a larger mortality because being more confined to their homes they are more subjected to the contaminated air containing the products of the expectoration.—In Central America the coasts of Mexico and especially the towns Vera Cruz and Tampico in the East, and Guayama and Mazatlan in the West, as well as the coasts of the Yucatan peninsula, of Mosquito and Panama are afflicted with rapidly progressing forms of consumption, as is also Lima on the coast of Peru. On the other hand the highlands of the Andes in Peru and the high plains of Mexico, Bolivia and Venezuela are more or less free from consumption.

The coast-lands of the Argentine Republic and those of Brazil are said to have been formerly quite free, but are greatly affected now since the population has increased considerably and many large towns have sprung up. On the other hand the villages and towns of the Cordilleras and their spurs enjoy as yet a certain amount of immunity. In British Guiana also the disease is assuming larger proportions. A great difference is noticeable there in the course of the illness; in the negroes it is very rapid and takes the form of a cheesy pneumonia, whereas in the coolies it is much slower and assumes more a catarrhal and peri-bronchial character.

In Egypt consumption is rarely seen in the interior and especially in the desert, but it is very frequent in the coast-towns such as Alexandria. In Algeria it is not very prevalent but neither is it altogether rare. It is said that the Kabyle remain free from the disease so long as they lead a nomad life. In the west of Africa tuberculosis is prevalent in many parts, near the sea as well as inland; the coast of Senegambia seems to make a striking exception. On the high table-land of South Africa the disease is rare.

This applies also to German-South-West-Africa, so that *Katz* has made the Utopian proposal that labour-colonies of work-people suffering from the disease in its early stages be formed there as a remedy for the

sufferers and as a means of raising the condition of the country.

In the East of Africa the disease is frequent and generally rapid in its course, and the same may be said with regard to the islands of Mauritius, Reunion and Madagascar. The same conditions prevail in the Polynesian islands, especially in the Sandwich group, and in most of the islands of the Indian Archipelago. In New Guinea pulmonary tuberculosis is either rare or as a rule imported.

On the high plains of Armenia, on the Syrian coast and on the high table-land of Persia consumption is relatively rare; in India it is not so prevalent as in the temperate latitudes of the Eastern hemisphere, but it does occur and it generally runs an exceedingly virulent course, like in the other regions of Eastern Asia which are tropically situated, namely Ceylon, Further India, and especially in Cochin-China, in China and Japan. On the other hand tuberculosis is exceedingly rare in the high plains of the Ghauts situated at an altitude of 1500-2000 meters, on the Nilgiri hills, and on the slopes of Himalaya.

Australia was formerly reputed to be highly immune, but has lost now this reputation, and it seems that the disease is constantly becoming more frequent among the increasing populations of the Australian coasts.

Climatic conditions alone without regard to other and especially social relations do not offer a sufficient explanation of the immense distribution of tuberculosis. The temperature does exercise a modifying influence, but is not the principal factor; neither cold alone nor heat alone can produce consumption, for there are regions both in the frigid and in the torrid zones which possess a high degree of immunity, and others which are severely affected. It is very probable that the humidity of the air is of injurious influence. The cause of the disease is in tropical and sub-tropical countries as a rule much more rapid than in the temperate and the cold zones; it has also been pointed out that consumption exhibits in hot countries an acute and sub-acute character, and in cold and temperate regions one of a more chronic nature.

An almost universally recognised principle is that the eleva-

tion of the soil above the level of the sea exerts a great influence on the frequency of consumption. As evidence of this we have the rarity of tuberculosis in the Peruvian Andes, on the high plains of Mexico, Bolivia, Guatemala, Salvador, New-Granada, and on the Rocky Mountains. In the higher regions of Guiana the disease is seldom seen, whereas in the valleys it is terribly destructive. The same may be said of Abyssinia, of the elevated points in Armenia, Persia, East-India, etc.

Negroes are said to be more inclined to fall a prey to consumption than any other races, and it is also said that the disease runs in their case a more rapidly fatal course. It is questionable whether this condition is due to a peculiar constitutional anomaly or whether it is insanitary housing accommodation, insufficient nourishment and the whole mode of life which are responsible for it. The same causes may apply with reference to the higher susceptibility of some nations in comparison to others, which we occasionally hear of.

Of importance are the experiences that large tracts which were more or less free from consumption before they were colonised, showed an increasing mortality from this disease after being opened-up, as f. i. the United States of North America, Brazil and Australia. In the first instance it is the tubercle bacillus of which we must think in this connection; but then we must also not forget that where large numbers of people who have to struggle for their daily bread congregate and where they are obliged to live under unsatisfactory conditions and without sufficient food, powerful etiological factors are created which cannot fail to materially assist in the spread of consumption.

It is not the purpose of this work to discuss the unfavourable social conditions and other evils, and as regards the reciprocal relation between marriage and consumption the reader is referred to the special chapter in this Manual dealing with the subject.

Anthropological observations.—In the conception and among the customs of national life, marriage plays one of the most important parts with respect to its preliminaries, preparatory steps and consummation on the one hand, and on

the other with regard to married life and the duties allotted to married individuals, in view of such contingencies as pregnancy, labour, child-bed, and the rearing of children. We see these vital processes surrounded by the most wonderful products of the imagination, from the simplest and even crudest psychical emotions to the highest possible poetical glorification. Tradition and religious belief have here the greatest scope. Those who wish for more detailed information on the point may with advantage consult the perfect work of *Ploss-Bartels*: "*Das Weib in der Natur- und Völkerkunde*" which is one of the gems of German literature. Here I will only give a short summary of the anthropological studies in so far as they relate to the human body and not to the psychical existence of man.

Marriage is a psychological factor which is necessary for the physical welfare of man as well as of woman. So long as there are no morbid influences, no moral or material troubles to contend against, the bodily appearance of married men and women always improves in consequence of their regular mode of life; the commencement of senile decay is materially postponed. It is a well-known fact proved by statistics that marriage has a beneficial influence on the duration of life.

Celibacy.—The modern institutions of society as constituted in our present-day civilised States where marriage is subject to certain formalities make it possible for man to gratify his sexual desires without coming into conflict with established arrangements. For this reason celibacy in man is not physically so discernible as in the female sex. The so-called "old bachelor" may in the course of time also acquire certain physical or more often moral peculiarities, but they are far more prominent in the "old maid."

In the unmarried girls of the German nation the loss of freshness begins on an average in the 27th or 28th year; but often the first signs of the transformation become visible at the even earlier age of 25, and once started it goes steadily forwards. Anatomically speaking, the rosy colour of the cheeks disappears gradually, the skin becomes softer, the lips pale and thin, the naso-labial fold sharply pronounced. Deep shadows form under the eyes, the latter acquire a dull lustre

and sorrowful expression. The voice receives a sharp by-sound. A part of the down on the face develops into short but distinct hairs. The adipose tissue of the integument diminishes, and this is especially noticeable in the breasts which become smaller and often also flaccid and pendulous; on this account the neck appears thin, the shoulders more pointed, and angular, and the upper ribs and clavicles become more prominent. Moral indisposition and all sorts of nervous complaints accompany these conditions very frequently. A regulated sexual intercourse such as our social institutions make possible for woman only in the form of marriage would act like a perfect source of youth. Thus nature has her fixed laws which demand their due with inexorable severity.

Among uncivilised nations there are no old maids. With them it would be something unheard of for a sexually mature girl not to become the wife of some man, either for an indefinite period or for a life-time.

The pelvis and its organs in various nationalities.—In view of the importance of the pelvis and the pelvic organs in married life I give here the following brief anthropological notice:

Apart from the differences which exist between the pelvis of the man and that of the woman, there are such variations among the female representatives of the several human races that next to the types of skull the pelvis has become to ethnographers the principal organ for racial differentiation. As a rule the individual differences agree with the fluctuations in the physical build.

The pelvis of the European woman serves as the starting point and normal type of the observations. The oval form should be peculiar to the Caucasians, the quadrilateral to the Mongolians, the round to the Americans, and the cuneiform to the Negroes. (*Weber.*) *Martin* has the following group: I, Pelvis with wide inlet, in which the conjugate is almost as long as the oblique diameter, and at the utmost by $1/10$ smaller than the oblique diameter; this is the case in the Bushwoman, the Malay, Javanese, the generality of American and Australian aborigines, and the aborigines of the islands in the

Indian and Pacific oceans; II, Pelvis with oblique-oval inlet, in which the conjugate is more than $1/10$ of its length shorter than the oblique diameter. This is the average form of pelvis in the Caucasian women, and that in the African negroes approaches it in shape. With the increase in the oblique diameter the capacity of these pelves grows; in this respect English-women are said to excel physically and according to *Litzmann's* measurements Holstein women come next.

The pelves of Jewesses in Dorpat are according to *Schroeter* very small.—*Gutierrez* says that the pelvis in Mexican women is small and especially narrow towards the outlet.

Further peculiarities of the pelvis are to be found in differences which exist in the size, thickness and position of the iliac bones. The wedge-shaped and longer pelvis of the negress suggests the pelvis of animals. Other pelvic bones are also said to possess characteristic racial differences. The width of the base of the sacrum reaches its maximum in the white race, especially in European women, after them come the yellow races and finally the black. The height of the sacrum varies from six vertebræ in the African negroes to five in the Europeans. The curvature of these bones is most marked in the white races, especially the Europeans, then follow the yellow races, and the flattest sacra are seen in the negroes.—The angle of inclination of the pelvis to the vertebral column is also variable in size.

There is no doubt that the mode of life, as well as customs and habits have a certain influence on the prevailing form of pelvis. Of the greatest importance is above all the nutrition of the skeleton as a whole and the supply of bone-forming material. The kind of dress generally in use may have some effect upon the pelvis, especially when it is growing, in mechanically altering its shape, and the same result may arise from prolonged attitudes of the body in certain positions or from some special form of activity. The manner of carrying their children on the buttocks as practised f. i. by negroes may be the cause of lordosis of the spine and of a secondary displacement of the pelvis.

Besides the bony frame of the pelvis it is the larger or

smaller amount of fatty connective tissue, which varies so much quantitatively in the different nations, that determines the form of the female hips. The latter together with the development of the thighs, calves and shoulders constitute the general appearance of woman which we designate generally as figure.

The fatty connective tissue of the gluteal region shows quantitatively many variations, by which the external appearance is naturally altered. Australian women are markedly deficient in fat; on the other hand they exhibit occasionally such an increase of the same that it leads in extreme cases to fatty buttocks or steatopygia, a condition peculiar to Bushwomen and Hottentot-women, and regarded by them as a sign of beauty.

As regards the genital organs proper there also exist special peculiarities. The vulva may be situated either somewhat higher as, according to *Columbat*, it is the case in French women, Spaniards, Italians and in the South generally, or less anteriorly as in English and Dutch women; in Australian women also the pudenda are situated more posteriorly. The size of the introitus, the direction and length of the vagina are subject to considerable variations. Especially multifarious are the larger and smaller labia; lax, more or less adipose, of small or considerable size, the latter reaching sometimes enormous proportions, as f. i. the so-called "Hottentot apron," an hypertrophic development of the labia minora probably of artificial origin. The size of the clitoris also varies from rudimentary proportions to considerable dimensions which are likewise produced frequently by artificial irritation.

Racial differences with regard to the internal female genital organs have hitherto not been noticed, and considering that their functions are everywhere alike such differences probably do not exist.

The female breasts.—The female breasts in their youthful freshness have, as is well-known, inspired the poets of all times with highly rapturous sensations. As a matter of fact they take among the secondary sexual characteristics the principal place, and we can judge from many songs what

demands the æsthetic taste of the various nations have made on the ideal form of this physical organ.

In speaking of the racial form of the female breast one does not generally think of it as it appears during child-bed or lactation, or when undergoing the changes brought about by advancing age, but of the youthful and virgin organ of sexually-mature young girls at their best age. Considerable varieties of form are here noticed in different races. Sometimes the nipple is small and flat like a little button, sometimes more massive and of conical shape with a broad base and rounded point, sometimes large and cylindrical, almost like a finger. Like the nipples, the areolæ also show considerable differences; sometimes they are pale, and sometimes dark-red, sometimes brown and even almost black in colour; sometimes they form small and sometimes large and even enormous surfaces; sometimes they project lightly and sometimes prominently like half-spheres from the curvature of the breasts, and sometimes they are separated from the latter by a pronounced circular constricting furrow.

It is possible that the different human races possess ethnographically well-marked characteristics in regard to the form of the female breast, and that the organ has undergone modifications under the influence of the mixture of races or nations. Hitherto no conclusive observations have been made on the point. But in order to fill up the gap for future observers I give here the following plan according to *Ploss-Bartels*: In regarding the curvature of the breasts we should notice whether they spring more or less immediately from the surface of the chest, or whether the latter begins from the clavicles downwards to gain in fatty connective tissue and to pass imperceptibly into the glands. The manner of their situation should be taken into consideration, whether they are placed higher up or lower down on the thorax, whether they take their origin nearer to the median line or nearer to the axilla. Of special importance is the consideration of their size (strong or massive, full, moderate, weak, small or sparse), their

consistency (standing, inclining, hanging), form and shape (saucer-like, semi-spherical, conical, goat-udder-like).

Physiology has given us proofs that the breasts belong to the sensual organs. The touch and gentle irritation of the mammary nerves are capable of producing by reflex action contractions in the uterine muscles, and in this way a pleasurable sensation in the entire organism. During sexual excitement the breasts swell and the nipples become stiff and erect. After conception and child-birth the breasts have quite a different signification for both mother and child.

The anatomical changes in the form which the organs show after lactation where they appear as more or less flaccid and lax cutaneous attachments, with wrinkled surfaces and discoloured areolæ are manifest in barbarous nations in many different ways. Whereas among civilised people the breasts are generally covered up and assisted by various kinds of support to obtain a pleasing form, the women of uncivilised nations are in the habit, especially in hot countries, of going about half-naked, and their ugly skin-bags hang down and away from the chest when they stoop over their work, in a most disfiguring manner.

Among barbarous nations and among those living in a semi-civilised state it is quite customary for the mothers to suckle their children, and it is unfortunately the women of the most civilised countries who neglect this duty either willingly or because of the physical inability of the mothers to fulfil it. This is the case with the old Hindus, the Japanese, the Chinese, and above all with the European nations, and chief among them the Germans and the French.

Under normal physical circumstances it is usual for Europeans to suckle their infants for about a year; country-people and also town-proletarians continue it sometimes up to two full years and even longer; a lactation of 2 to 3 years is practised by many women mostly out of Europe, and there are authentic reports that they prolong it very often for many years, even up to the 15th. (Eskimos.) The reasons for this are on the

part of the child a certain feeling of satisfaction, on the part of the mother a pleasurable sensation. The general opinion that so long as a mother suckles her child she runs no risk of conceiving has also something to do with the matter.

Prolificness.—Most nations in the world desire large families and the fruitfulness of the wife is regarded as a special blessing and as high conjugal bliss. Sterility on the other hand is looked upon as an imperfection of the wife. Where the evil cannot be removed, where it is not possible to break the spell adhering to the wife or to appease the anger of the deity, the woman is often turned away. As to the cause of sterility there existed in olden times and exist even yet among barbarous nations all sorts of mystical opinions, but the recognition is gradually advancing that abnormal physical development or diseased conditions in the wife must be responsible for it.

A high regard for fruitfulness is not common to all nations; some regard it even as something contemptible and animal-like (Greenlanders). In Europe also and among many civilised nations generally the joy at accessions rapidly following one another is very small.—The Roman Emperor Augustus fixed definite penalties for childlessness.—Unfruitfulness is considered in the Orient as a disgrace and Mahometans as well as the Eastern Jews regard it as a ground for divorce. The Turkish woman who has no children is but little respected. Chinese women look upon large families as the greatest blessing. The nations of Africa also consider childlessness as a disgrace.

From times immemorial endeavours have been made to counteract unfruitfulness, and all sorts of mysterious procedures have been adopted, such as medicines and mechanical remedies, baths, appeals for divine help in many forms and for supernatural human aid, sympathetic remedies, the invocation of assistance from dead persons, etc.

On the other hand there are occasions when temporary or permanent unfruitfulness appears to be desirable. Preventive measures of various sorts have been recommended, f. i. the interrupted form of intercourse, drugs and mechanical appli-

ances, etc. They are employed more by civilised than by uncivilised nations.

Considerable differences exist in the fruitfulness of different races, and occasionally it is possible to discover the causes by which these differences are produced. For details the reader is referred to the work of *Ploss-Bartels*.

If there happens to be in two nations of different races, a difference in the degree of their fruitfulness it does not by any means follow that a racial distinction is present. For closer investigation shows that greater or smaller fruitfulness depends greatly from a number of other factors as well. One of these is the moral condition of the population, its social state and associated with it the relative ages of the procreators to one another. One may doubtless regard as a favourable sign of the well-being of a nation its constant increase by means of a growing number of legitimately-born children; on the other hand a gradual decrease in the latter is a sure indication of a morbid state of morality or of social and political decay. We have evidence of this in the stagnant development of the French population.

It has been ascertained that marriages are most fruitful when husband and wife are of the same age or when the husband is from one to six years older than the wife. *Quetelet* summarised the results of the observations on the influence of age upon the number of births as follows: Early marriages favour sterility; from the 33d year in the man and the 26th in the woman fruitfulness begins to diminish; at about this period it reaches the highest point. The difference in the ages of the procreators depends of course partly also on the earlier or later beginning of puberty, and also on climatic elements.

It is known that in the Southern countries with Latin populations marriages are as a rule entered earlier into than in the North, partly on account of the earlier appearance of physical and social maturity among the inhabitants of the former, and partly because generally speaking there is not so much wanted there to establish a household and to maintain a family, and a livelihood is more easily gained than in Northern countries.

Moreover almost all Southern nations are more inclined towards matrimony than the more careful and circumspect Northerners, especially of Germanic Europe. It is consequently not so much race and climate as a state of civilisation brought about by conditions of development based on an historical foundation, and the mode of life regulating the sexual relations, which are the decisive factors. This accounts for the fact that different nationalities living in the East under the same climatic conditions exhibit different degrees of fruitfulness. Thus *Damian Georg* wrote about the nations living in Greece, that the Jews and Armenians there are very fruitful, the Greeks less so, and the Turks least of all.

It is reported that in the United States the women in the 5th and 6th generations become gradually paler and thinner. It is a fact that the number of births in North America is diminishing; the disinclination of the American women to assume the obligations of motherhood is not unconnected with this diminution.

The fruitfulness of European families emigrating to the tropics diminishes and a constant supply of fresh European blood is advisable for the purpose of keeping that fruitfulness alive.

It is also to be taken into consideration that favourable circumstances exert in every population a great influence on the procreation of descendants, but that numerous incidents such as the overburdening of the female sex and the frequent abortions resulting in consequence, premature marriages, the prevalence of certain diseases, debilitating habits of the male sex, etc. tend to prevent a great increase in the number of births. This is probably also the cause of the relatively smaller fruitfulness shown by some nations.

Accidental miscarriages.—Not a few nations of the earth suffer greatly from natural miscarriages. In very many cases the reason is to be looked for in an irrational mode of life, and among uncivilised nations to a great extent in the over-burdening of the women.

Thus the cause of the remarkable unfruitfulness in

New-Zealand lies not only in the infanticide prevalent there, but also probably in the severe manual labour which the women have to perform, and in the hardships connected with their nomadic life. *De Rochebrune* says that miscarriages occur very frequently among the Woloffs, principally on account of the hard life which their women lead and because in addition to their household duties they go on for hours at a stretch crushing millets, a very laborious and fatiguing occupation; they are also in the habit of carousing all through the night when they execute to musical accompaniment exciting and obscene dances of which rotation of the pelvic region is a distinguishing feature.

A certain physical predisposition of such nations to miscarriages must be presumed, for other barbarous tribes suffer very little from them though their women also work very hard, and during pregnancy too. This is for instance the case among the lower classes in China where women are employed in the very laborious occupation of rowers, whilst the rich Chinese ladies exhibit a great inclination to miscarriages on account of their mode of living; the mutilation of their feet forces them to lead a sedentary life and occasions in them an absence of resistibility. In Persia though the women are in the habit of riding on horseback in the same way as men, even when they are pregnant, natural miscarriage is very rare.

As a cause of miscarriages we may also mention a certain kind of manual treatment which pregnant women undergo among some nations, f. i. the kneading of Mexican women in the 7th month, a special sort of massage employed by the Javanese, similarly the custom of very hot baths as practised in Turkey, etc.

The influence of a strange climate has also been accused of being an occasional cause of miscarriage, perhaps less on account of the high temperature than of the malaria so generally prevalent. Acclimatised individuals are less threatened than new arrivals. Among the natives of Cayenne and Guiana, miscarriage is rare, but it is more frequent among European women who arrive there in a condition of pregnancy or who

become pregnant after a short sojourn. In the Nile countries also European women frequently abort; so they do when living in India during the hot season; the same thing is reported with regard to the tropical parts of Brazil.

Of European women it is generally supposed that Frenchwomen are exceedingly predisposed to miscarriages perhaps because of the frequency with which they bathe and on account of the anomalies which their genital organs present very often.

Premeditated abortion.—It is not correct to regard artificial abortion as a morbid excrescence of civilisation, inasmuch as semi-civilised nations and even many barbarous ones practise it as well. We may conclude from this on the one hand that the unborn child is considered of very little value, and on the other that the danger of abortion to the mother are not thought to be very great.

It is worth mentioning that, according to *Scherzer*, the natives in New-South-Wales are gradually dying off because abortion is so prevalent among them. It is practised by barbarous nations on account of the difficulties connected with the bringing-up of children. The privations and tortures which the native Australian women have to suffer during pregnancy and labour are such that they prefer to avoid the results of pregnancy. Of the female inhabitants of New-Caledonia, Samoa, Tahiti and Hawaii it is reported that they practise abortion for the purpose of preventing their breasts from becoming flabby and lax. In the Malay Archipelago emmenagogues are much in use without causing any lasting inconvenience to the bodies of the women. *Stevens* reports that in one portion of Malakkha abortion is abhorred, and in another generally practised for the purpose of escaping the work caused by the growing child; if a married woman is found out to have induced abortion, her husband is allowed to punish her severely with a club. Infanticide is rare in Borneo because it is anticipated by abortion. "In no country in the world," says *Allan Webb* of Calcutta, "are infanticide and abortion so frequent as in India, and though

the English Government has succeeded in putting a stop to the murder of newly-born children, it is powerless to prevent abortions, which have caused and still cause the death of many a mother." On account of the facility and impunity of artificial abortion there are no illegitimate children in the Orient, but even among the better classes it is no rare thing in Constantinople, f. i. for married people to procure abortion when they have already two children, including a boy. A considerable number of African nations practise abortion; thus the Egyptian and Algerian women; there are in Algiers Jewesses who carry on the practice in booths in public places. Whilst a few of the North-American Indian tribes abhor abortion, many others are almost extinct owing to the prevalence of the practice among them.

It is well known that among the whites of North America abortion is very much in vogue, and that especially in the large towns of the United States there are special institutions where girls and women can undergo premature confinement; all American newspapers contain public announcements respecting such places of ill-repute. Women do not see anything immoral in telling casual acquaintances that they did not wish to have any children and that they journey to St. Louis or New Orleans for the purpose of procuring abortion. In Europe also the practice seems to gain in favour. We know at the present time much more about the matter in so far as it relates to numerous foreign countries, than as to what takes place nearer home.

By far the most frequent and most usual cause of abortion is the desire to remove a dishonouring pregnancy; next to it are pecuniary considerations. Fashion also is an important element, as it is with some nations against established custom to have children in the first year or two after marriage, or more than one or two children altogether; there is further the disinclination of the women to undergo the inconvenience of lactation, or the troubles of bringing up children; other causes are jealousy, female vanity and other such defects.

It is therefore seen that abortion is not, as it is frequently maintained, a result of degenerate social conditions such as

constitute the drawbacks of a state of civilisation. The evil is older than civilisation; for the perception that an interference of this kind is wrong makes its way only gradually and slowly in the conscience of a people. It was much later that religious and political legislators endeavoured to combat the destruction of embryonic life by regulations and threats of punishment. The influence of the criminal law however has hitherto not been powerful enough, and those concerned in the matter have devoted far too little attention to an alteration in the social circumstances by which the evil could be removed (*Ploss-Bartels*).

VI

Sexual Hygiene in Married Life

VI

SEXUAL HYGIENE IN MARRIED LIFE

By **Professor P. Fürbringer** (Berlin)

IN dealing, as being a part of the subject of this treatise, with the question how the sexual intercourse of married persons should be exercised in accordance with medical opinion that is in such a manner as not to prove injurious to either partner, this article is intended, in the first instance, to provide the medical profession with a guide for young husbands; husbands, because it is they who are the controllers of the act and who as a rule play the more active part, and young, because those who are no longer so have by experience learned how to correct their early mistakes.

It is clear that where the main object is how to prevent diseases by the avoidance of errors in sexual intercourse, the diseases as such cannot form part of the subject discussed. Hygiene is not medical treatment. I shall therefore confine myself to the consideration of the physiological conditions and of those lighter disturbances which are not yet regarded by the general public of sufficient importance to induce those numerous individuals who are subject to them to seek medical advice. If I include here from a practical point of view the predispositions to disease as well, I can do no more than barely touch occasionally the fringe of the vast range of disease proper, and must refer for further elucidation to the exhaustive articles of the other contributors to this work. Nevertheless—this lies in the nature of the subject—it will hardly be possible to avoid introducing such conditions as nervous diseases, diseases of the genital organs of both sexes, or pregnancy, or entering into the consideration of the hygienic significance of marriage.

In agreement with the view expressed by the senior Editor

of this work under the third heading, with regard to the part played by the sexual intercourse *per se* of married individuals, that is, in the absence of any transmissible disease, there arises, as a special part of the subject, the question as to the manner and frequency of the act of copulation in the normal life of the married persons, and especially during menstruation, pregnancy and child-bed or in other words during the period of involution. Indissolubly connected with this subject is a consideration of the different methods employed to prevent conception, of sexual continency and of some general hygienic measures in so far as they are calculated to serve the interests of a correct sexual intercourse.

The literature on the subject from this point of view is rather scanty, and yet if looked for carefully not quite so poor as it is generally believed. In any case there is no text-book treating of the subject-matter as a whole to serve to medical men as a guide and for reference. Not sufficiently known and appreciated are as yet three lectures by the Swedish author *Ribbing* entitled: "Sexual Hygiene and its ethical consequences"¹ a work full of lofty sentiment dealing with the principal points of the subject in a thorough and worthy manner. Several German authors have also devoted considerable attention to the subject. We will name their works without in any way detracting from the value of other more general observations met with in various writings without any references to literature—and of these there are a great many. I myself have also dealt with various points of the subject in my article "Disturbances in the sexual functions of the male sex."² The fairly comprehensive literature given there has to a great extent been made use of in connection with this contribution, and the experiences laid down on the former occasion will be materially amplified in these pages.

Regulation and performance of sexual intercourse.—Beginning with the technique of the sexual act it is no use denying that the activity of the physician in this

¹*B. Reyher*, Leipsic 1890. (3d edit.)

²*Nothnagel's Spezielle Pathologie und Therapie*, Vol. 19, 3d part, 2d edit. Vienna 1901.

direction is a very limited one indeed. Not very often, "but rather seldom" (*v. Schrenck-Notzing*) is a doctor consulted before the consummation of arranged marriages, and equally rarely does it happen that the husband is a novice in the matter. As a rule he knows "how it is done." It is not my present concern to express an opinion on the moral justification of pre-nubial intercourse or to enter into a discussion on the extent to which public opinion under our present-day civilisation permits or even sanctions the practice. Like *Ribbing*, *Rubner* and other authors I cannot look upon it as a desirable object, and still less as a remedy to be recommended by the practitioner. I shall presently give my reasons for this attitude. Fortunately, moreover, the chaste young man is not absolutely extinct. From observations extending over many years among private patients and also in hospital practice I can testify to this being the case even in Berlin—that metropolis so full of temptations. If one often hears "liaisons" spoken of as something quite natural, in the presence of the parent accompanying the patient, who not infrequently even confesses to having advised the son in that direction, there are still a certain number of inexperienced young men left whose questions to the doctor are downright sincere.

There is always a certain amount of "offensiveness" in the treatment of subjects pertaining to the sexual functions. But it is the duty of the medical man to answer conscientiously and to the best of his ability questions relating to health addressed to him by those seeking his advice and it is even permissible under circumstances to exhibit a certain inquisitiveness into the most intimate details of married life. He is but a poor doctor who cannot make his patient realise that idle curiosity is not a part of his profession! But on the other hand he must also expect occasionally to derive pain and disgust from the revelations made to him at his instigation, though rarely so in the case of newly-wedded female patients. The authoress *Fischer-Dückelmann* is perfectly justified in calling attention to the evil consequences often resulting from a neglect on the part of many male doctors to inquire into the moral side of the married life of their female patients.

Position.—I should not have entered into the question of position during the sexual act of married people if I were not convinced from a perusal of the many contributions on the subject, that what is natural is not always obvious. The hygienic importance of the position in which the act is exercised most easily and most agreeably and which requires least muscular exertion namely the horizontal one with body against body, was already known in most ancient times as we read in the work of *Ploss* and *Bartels*,¹ and this position has been handed down to us by pen and pencil as the one which has always been generally adopted. That it is the woman who occupies the lowermost position may be regarded as symbolical of the lordship of the male sex, of the submission of the weak to the strong, unless we see in it also elements of shelter and protection. And yet natural as it is, this question of position frequently necessitates special words of advice on the part of the physician as I can testify from personal experience, and it behoves us on such occasions to be plainly outspoken. Many a case of so-called male impotency—and I allude here particularly to individuals affected with light psychical ailments, congenital or acquired—is nothing but inhibition depending entirely or to a great extent upon the false modesty and awkwardness of the female partner, and could soon be set right by a proper medical consultation in her presence. And how often do otherwise highly intelligent young husbands confess ignorance as to whether they perform their marital duties in a normal manner? It is under such circumstances the duty of the physician to be prepared to expound the most rational arrangement in candid and suitable words, and even to dwell on the necessity of properly separating the thighs and raising the sacrum. Doubtless a great deal of tact is in such cases required, especially in the presence of female modesty, the more so as the number of virgins contracting matrimony is far greater in proportion than that of chaste young men, not only among the upper classes but also among the lower. I decidedly believe this to be the case although the wife is generally the better informed partner in matters per-

¹Das Weib in der Natur- und Völkerkunde. 4th edit. Leipsic 1895.

taining to the married state and in spite of occasional astonishing confessions. I think it necessary to emphasize the point, as there are many others of a different opinion, and because of the incredible statement publicly made a few years ago by a Berlin theologian which drew upon him a well-merited rebuke.

In addition to the natural position there are quite a number of others which have to a great extent been adopted by both uncivilised and civilised nations but which we cannot regard as normal. This applies to the lateral position, the dorsal position of the man, the coitus cum uxore inverso, which may go so far as to imitate the process in animals, that is copulation while standing or sitting. To be quite frank, I can hardly think of any combination which does not figure among my case-notes as having been practised by my patients. It is in such cases difficult to draw the line between harmless and transient indiscretions of newly-married people and the subtle contrivances of the sensualist. While it is of course the bounden duty of the physician to condemn the latter emphatically not only on moral grounds but also on account of the mechanical injuries which they are apt to cause and of which we shall speak again later on, there are occasionally circumstances which render a departure from the normal procedure permissible and even medically advisable. I am thinking f. i. of the case where it is necessary to protect a delicate and sensitive wife from the ponderous weight of a corpulent husband.¹ I shall return to this point when discussing the question of intercourse during pregnancy. But there may also be a pathological sensitiveness present in the wife consequent on morbid processes in the pelvic or abdominal organs which makes it imperative to prescribe a method of connexion that would entail no pressure—provided, of course that it is not necessary to forbid intercourse altogether. In this connection I must also mention briefly the attitude of the physician with regard to the reflux of the semen from the vagina

¹It is evident that when both husband and wife have large abdomens, there are mechanical obstacles against the normal performance of the act, and abnormal positions such as coitus a posteriori and others are necessarily resorted to. As a rule however, the doctor is not consulted in such cases.

after intercourse, as a cause of absence of conception, a condition described by *P. Müller*,¹ *Hegar*, *Kaltenbach* and other gynæcologists. Apart from operative measures there arise as suitable precautions, the dorso-coccygeal position of the wife so as to tilt the vagina backwards, the raising upwards of the abdominal walls in order to aspirate the semen, the retaining of the penis in the vagina for some time until the relaxation of the excited pelvic musculature, the throwing of one thigh over the other after the removal of the penis, the substitution for the latter procedure of closing the vagina with the fingers—not a very agreeable operation, etc. Finally we are compelled for practical reasons to acquiesce in the assumption of abnormal positions during the act in the not very infrequent abortive forms of relative impotency when they render possible the performance of marital intercourse. The provisions indicated for the exercise of sexual connexion on the part of individuals affected with severer forms of impotency or perverse sexual sensations do not belong to this chapter. It is sufficient here on the one hand to warn medical men against placing too much reliance on the assurance of their patients that they will undoubtedly benefit by giving way to their voluptuous and cynical phantasy, and on the other to impress upon them the necessity of retaining their sound judgment with respect to the unfounded fear that serious diseases are apt to result from the exercise of the sexual act in abnormal positions. I do not forget that many medical men entertain the belief that severe diseases of the spinal cord are particularly likely to be caused by the performance of sexual connection in the standing position.

Avoidance of force.—It is also necessary that the sexual act shall take place without the application of force. This injunction is very much offended against especially by brutal husbands and also by such men whose rough nature does not enable them to appreciate the greater sensitiveness and finer structure of the female organism. What disastrous effects the membrum virile in its erected state is capable of, if used impetuously, we can see from the no longer sparse authentic reports

¹Die Unfruchtbarkeit der Ehe. Stuttgart, 1885.

quoted chiefly in the Manuals on Medical Jurisprudence and known hardly well enough by the medical profession. In more than a dozen cases death through hæmorrhage was caused by severe injury to different parts of the vagina and to the clitoris; in the often quoted case of *Albert*, a sixteen-year-old Arab had in natural intercourse among other injuries lacerated the vagina of his very young and not yet marriageable wife so completely that it communicated with the abdominal cavity. A few years ago a pregnant working-woman aged 26 was brought dead to the hospital with which I am connected. She had suddenly collapsed bleeding after intercourse in the standing position with the young man to whom she was engaged to be married and who was of the same age. They were both drunk. The autopsy (*v. Hansemann*) revealed a laceration of the urinary meatus and of one of the corpora cavernosa of the clitoris. *Wichmann* who reported the case rightly concluded that the membrum must have taken a wrong course and overcome the resistance above the introitus by the creation of a false passage.

While injury to the male genital organs in consequence of intercourse is exceedingly rare, such sad accidents as those described above are fortunately also exceptional and to a great extent dependent upon concurrent special circumstances, f. i. extreme youth or old age, pregnancy, child-bed, pathological conditions of the genitals, inappropriate position during intercourse, excessive size of the penis, intoxication, etc. But even the so-called normal perforation of the hymen may prove highly injurious inasmuch as it may cause profuse hæmorrhage or inflammatory conditions, especially where a certain amount of force is needed to rupture a somewhat resistant membrane or where intercourse has been resumed before the injury has had time to heal up.¹ I am perfectly satisfied that the number of young married women who have a lasting painful recollection of their first sexual intercourse exceeds by far the number of those who venture to consult a doctor, whereas it but rarely

¹In some countries, f. i. China, India, South America, the hymen is ruptured by the mothers or nurses of the children at a very early age, not so much for the sake of cleanliness as for the purpose of preparing them for the sexual function.—*Ploss-Bartels*.

happens that even very sensitive husbands suffer more than temporary inconvenience from slight superficial abrasions on the penis as a consequence of their exertions in the first days of their married life. I should consider in such cases a careful digital rupture of the hymen the lesser of two evils. It is true that only a husband who is himself a medical man would adopt this procedure, otherwise it will hardly be possible to do anything else but perform an incision as the quickest and the easiest method. Further measures as well as the treatment necessary in cases of vaginismus which by the bye must not be confused with the vaginal hyperæsthesia (*Olshausen*) so frequently seen in young married women, will be found in the chapters on nervous diseases and on diseases of women. But even under normal conditions, where both husband and wife are in perfect health, it is incumbent on the gentle-mannered husband, as *Ribbing* says, to pay every consideration to the tender feelings of his wife; he must endeavour to use that discretion for which Shakespeare's Imogen begs so diffidently from her husband Posthumus. Very true are the remarks with regard to sexual trauma in the work of *Breuer* and *Freud* on hysteria. The nuptial injury to the newly married woman may be the result of mental anxiety mixed with a fear of something unknown, some foreboding of evil. As experience has frequently taught me even a well-beloved husband is capable of inflicting deep and lasting wounds to the feelings of his young wife, if he does not know how to restrain himself in the first night after the marriage.

Time of intercourse.—As regards the time when sexual intercourse is best exercised it would appear that the hour chosen almost instinctively by the majority of people, namely the evening or the time of going to bed, is hygienically correct, if only on account of the necessary undressing and of the fatigue succeeding the act. That the latter is as a rule productive in the man of higher—and even forceful—degrees of somnolence than in the woman may be regarded as an established fact.¹ This

¹Translator's note. On this point I am rather inclined to disagree with the author.

agrees moreover with the greater amount of activity on the part of the male partner during the act, and with the more intense pleasurable excitement which he experiences.¹ Though the degree of orgasm is different in different individuals and dependent upon disposition and temperament—there are numerous possible intermediate stages between a pleasurable feeling of contentment and frantic voluptuousness—it is very seldom indeed that the sudden engorgement and the still more rapid relaxation after ejaculation are absent in any marked degree.² This relaxing effect possesses under physiological conditions a feeling of fitness but is decidedly antagonistic to the desire for work. I must insist upon this opinion which is contrary to recent utterances on the subject. Nevertheless there are occasionally married couples who choose the morning time, and others who prefer the after-dinner hour, or the time after their principal meal. In the one case it is probably the renewed vigour after a long sleep, in the other an increased desire through food and drink and especially alcoholic liquors

¹According to Guttzeit as many as 4 out of every 10 women do not experience any sensation in sexual intercourse. *O. Adler* who has treated of the *Anæsthesia sexualis feminarum* or "Dyspareunia" (*Kisch*) in a special work which has just appeared (Berlin 1904) is inclined to agree with this opinion. Though I am prepared to accept the statement that total and partial anæsthesia is exceedingly frequent in women, as it is so very difficult to obtain reliable statistics on the point, I cannot, judging from my experience, allow the above figure (40%!) to pass unless we include the lightest forms of female anaphrodisia. Whether it is true that under some circumstances coitus a posteriori is therapeutically indicated in order to excite sufficiently certain parts, I am not in a position to say. It is however strange that a very recent pamphlet on the sexual sensation in woman and man from the pen of a lady, *J. Elberskirchen*, insists on the equality of the female desire and demands free satisfaction of the same within physiological limits. What has so far been established by statistics does not seem enough to justify the suppression of the wish for further enlightenment on the subject.

²According to *von Krafft-Ebing* the orgasm in woman both appears and disappears more slowly than in man. *Adler* gives two different charts, one with an acute angle, the other with an obtuse, which he associates with dyspareunia. Where the husband does not accommodate himself accordingly out of consideration to the wife the latter does not miss anything or else completes the act manually. I know a large number of similar cases, but deviations from these charts and from their conclusions are probably more frequent.

which is the determining factor. As a matter of fact I have occasionally in cases where proper erection was not obtainable in the evening, like *Rohleder*,¹ recommended with success a change to other times of the day. As a rule however the physician should in my opinion oppose such practices as they are likely to grow into a habit, especially where heavy meals come into consideration. The reason is to be found in the above remarks to which we ought to add the danger of serious accidents in the case of elderly people, particularly where there is an inclination to arteriosclerosis (apoplexy). There is also some risk of gastric and intestinal troubles in the exercise of the sexual act immediately after a meal (*Féré*), while *Curschmann*² and *Löwenfeld*³ are distinctly opposed to all exertion after the act as being highly weakening. Finally, sexual intercourse during intoxication, to the dangers of which with respect to injuries I have already referred, is according to *Donner*, on account of the prolongation of the act, equal in its effect to that of excess. Sexual intercourse should never take place in tight-fitting clothes.

For the rest I am not in a position to lay down any definite practical rules with regard to the choice of time, particularly in respect of a sexual periodicity such as *Havelock Ellis*⁴ is inclined to adopt from comparison with the habits of male and female masturbators. Though certain individuals do occasionally exhibit within physiological limits a certain regularity in the fluctuation of their sexual desire, it does not seem proper to speak of weekly cycles and monthly crises. For it is just this characteristic differential quality which distinguishes man from animals. Whereas nature has in the case of many of the latter ordained that the powerful sexual desire which is necessary for the continuation of the species shall recur periodically (rut), she has been so generous to the former as to provide him with a continuous sexual ability for the whole of his sexual life.

¹Ueber Sexualtrieb und Sexualleben des Menschen. 2d edit. Berlin 1902.

²Die functionellen Störungen der Männlichen Genitalien. v. *Ziemssen's* Handbuch d. spez. Pathol. u. Ther. IX. 2. 1878.

³Sexualleben und Nierenleiden. 3d edit. Wiesbaden 1903.

⁴Geschlechtstrieb und Schamgefühl. *Kötscher*. 2d edit. Leipsic, 1901.

This is also shown by the superior sexual activity of the man over that of the woman, and it is only the masturbator with his practically unlimited opportunities to satisfy his craving who is better off with regard to a fixed time. But just because it is so, just because the husband may choose the time and hour at his pleasure and just because he is the one that receives as a rule more enjoyment from the sexual intercourse, but also because the connubial state interests two individuals, I am inclined to agree with *Ribbing* that it is not right for one of these individuals to decide alone the common affairs of the partnership. The considerate husband is received quite differently in the nuptial bed than the brutal egotist. On the other hand it is to be remembered that refusal to fulfil one's conjugal obligations constitutes in some countries one of the grounds for divorce. The conduct of the husband during menstruation and pregnancy will be discussed more fully later on.

Frequency of sexual intercourse.—More difficult to decide than the points considered so far is the question as to how often the sexual act should be exercised. In this connection we have for guidance a number of ancient legislative enactments. *Zoroaster*, *Solon* and *Mohammed* prescribe under normal circumstances three to four connubial embraces in a month. The Talmud differentiates in its injunctions according to the social position and vocation of the individual; the well-to-do and strong young man who is not engaged in any laborious work is required to fulfil his marital duty every day, whereas artisans, workmen and scholars being busy men and having exacting work to perform, should not be called upon more than once or twice a week and ought even to be permitted occasional long pauses, lasting one or more months. Luther's dictum "Die Woche zwier" (twice a week) is well-known both to doctors and laymen. In modern times such numerical prescriptions have to a great extent fallen into disuse, probably because it has been recognised more and more that even within physiological limits the sexual ability of individuals differs very much, and that it is exceedingly difficult to draw the line between normality and abuse. Though this law has been advocated most convincingly by such experts as *Curschmann*, *Erb*, v.

gyurgovechky,¹ *Eulenburg*,² *Löwenfeld* and others, it has been my endeavour, having come across all kinds of possible intermediate degrees between indefatigable insatiety³ and extreme moderateness, to point out that even in the same individual the normal sexual potency fluctuates within wide boundaries. Nevertheless I am of the opinion that the extraordinary deviations from the average form the exception—even *Mantegazza* speaks of his “grandi amatori” as rarities—and that a numerical rule for the average man is not to be regarded quite as “ridiculous.” *Ribbing* says: “It would be better for many a marriage if such a rule were generally adopted.” To reject a number altogether because it does not apply to everybody would be regrettable both from the point of view of the doctor as well as from that of the patients seeking his advice. There must be some guiding general principle unless we wish to leave the matter entirely to the decision of each individual and to let every one find out for himself what he should do, on the basis of “*experientia docet*.” Although the errors of youthful

¹Pathologie und Therapie der männlichen Impotenz. 2d edit. Vienna and Leipsic 1897.

²Sexuale Neuropathie, Genitale Neurosen und Neuropsychosen der Männer und Frauen. Leipsic 1895.

³We have an example of a real Don Juan in Nero (and his counter-part Messalina), who, like the legendary Tannhäuser, can hardly be regarded as a non-existent phantom. There have been many who have been capable with impunity of ten times the amount allowed by Luther (*Erb*). *Trousseau* mentions tabetics who could perform the act eight to ten times in one day or night. *Löwenfeld* has reported of even more in healthy individuals. A gentleman 54 years of age, has to my knowledge had sexual intercourse with his wife on an average twice daily for many years though an examination revealed diabetes. A merchant of the same age had (adulterous) connection no less than fifteen times in three consecutive days without any marked inconvenience. Finally a young Russian confessed to me that in the first years of his married life he had connection with his wife every night three or four times, without feeling in any way the worse. The orgies of young married couples on their honeymoon are sometimes past all description, and yet they do not necessarily lead to any ill results. The translator would like to add to these experiences a case from his own practice, and that is, a man about 36 years old, married now some 10 years, who in spite of (or perhaps on account of?) chronic gonorrhœa is able to have frequent connection with his wife, often as much as 4 or 5 times in one night. He is not by any means a robust man, and probably tuberculously inclined. Perhaps the last-mentioned circumstance is not without its significance.

orgies and the consequences of excesses in the happy early years of marriage often correct themselves after a time, there are still a considerable number of cases left in which the observing eye of the physician may detect impending or accomplished trouble and advise accordingly. I have too often had occasion to explain to guileless young couples the connection between cause and effect to allow myself to rest satisfied with a policy of "laissez faire," and to place my reliance on individual discretion and self-control. The choice between a numerical rule and guidance by one's subjective feeling post coitum is often anticipated by serious mischief, and for this reason I have for many years unhesitatingly recommended under anything like "normal" circumstances—and it is the duty of the medical man to find these out—50 to 100 single acts in the course of a year as a hygienic precaution. This limitation which takes into account the menstruating periods—but not of course, pregnancy, long absence of either husband or wife, or more or less chronic diseases, etc.—leaves sufficient room for the fluctuations due to various external causes as well as to different physical and psychical conditions; it is also, apart from the older regulations discussed above, in fairly complete accord with the rule laid down by *Ribbing* (under perfectly normal circumstances, and between the natural interruptions, about 3 or 4 times a week); and it is not grossly contradictory to the expert *Acton's* suggestion of a weekly turn in the case of jaded town-dwellers. It is finally in agreement with one's notion of true moderateness and rather more reasonable than the over-carefulness of the philistine. The sexual ability as the manifestation of an "appetitus coeundi" has not unaptly been compared to the gastric and intestinal functions. We find this comparison first expressed by *Beard* and *Rockwell*¹ in a due appreciation of the relative ideas. Undoubtedly the man with a robust digestive apparatus can afford to laugh at the individual who in spite of a healthy appetite is obliged to adhere to a strict diet; but what these authors have omitted to take into consideration is that in eating and drinking it is also necessary

¹Sexual Neurasthenia, its Hygiene, Etiology, Symptomatology and Treatment. 2nd edition.

to be careful and to avoid excesses. For this reason I am in the habit of answering in the negative all questions as to the advisability of immediate repetition of marital intercourse just as I am opposed to the practice of double meals as being a non-hygienic procedure. But for all that I do not believe in undue pedantry. Occasional outbursts of exuberance when in full possession of the vital powers are not generally of any consequence especially in the case of young married couples who enjoy life and have no worries to weaken them. It is of course different where, as it frequently happens, May has wedded December and where the old man notices that his young bride does not want to be "spared."¹ The busy doctor often hears complaints on this score from the female partners as well. He will do well in such cases to recommend as a precaution against premature senile impotency the regular performance of the marital duty, even if the desire is not very strong, so "as to keep in practice." I heard once this opinion confirmed unanimously by a company of elderly brother-practitioners, when I happened to be a secret listener. Fortunately there are among women plenty of frigid natures.

Consequences of sexual excess.—The consideration of the concrete forms of the injury to health caused by excess of connubial intercourse, both absolute and relative, is outside my present task and I must refer the reader to the special chapters of this work in which experienced specialists, neurologists, and gynæcologists treat of the different subjects in this connection. Personally I have for many years devoted considerable attention to the question and will here only summarise that in definition of sexual neurasthenia I have, in spite of my unshaken belief in the predominance of a nervous predisposition, attached a very important ætiological part to

¹In my opinion the decisive turn in a man's life falls on an average in the sixth decade, or possibly in the middle of the fifth, though it is by no means a rare thing to come across men of over 60 who are perfectly potent. It would not be amiss if the legislature which recognises a minimum marriageable age would take into consideration this aspect of the matter as well, especially in view of the circumstance that there are always a large number of old men on the look-out for young wives. Often enough the health of these people suffers objectively, a fact pointed out by *Löwenfeld* and others.

sexual injuries. It is here where sexual mismanagement shows its characteristic results. The excessive natural coitus is in this respect certainly far behind masturbation with its devastating effects—almost all authors agree upon this point—and the experienced practitioner will in principle share the view of *Curschmann* that marriage directs the unbridled passions into the right channel. But serious consequences of extravagant nuptial intercourse are by no means unknown, and it is principally the husband who is by nature more sensually and passionately inclined that suffers from them to a greater extent than the wife whose nervous system is far less affected by the sexual act; even if we ignore entirely for the moment impotency and spermatorrhœa. This explains how it happens sometimes that while the husband becomes after marriage more and more miserable the wife becomes more and more healthy-looking. (*Löwenfeld*.) Even individuals formerly in the best of health may pay heavy tribute to the too frequent marital intercourse in the shape of typical neurasthenia. Thus *Binswanger*¹ was able to demonstrate connubial excess in very young or very old married persons as the only cause of neurosis; and *Eulenburg* has seen sexual neurasthenia as an immediate consequence of highly exhausting venereal orgies. Though in the majority of cases the ill-effects disappear more or less completely, there remain occasionally, especially in newly-married individuals, most serious disturbances of a permanent nature as a result of sexual abuse. I must in this respect agree with the opinion of *Löwenfeld*.²

Conduct during menstruation.—How should married people conduct themselves during menstruation? This question has received but little consideration in scientific litera-

¹Die Pathologie u. Therapie d. Neurasthenie. Jena 1896.

²In a case observed by *Hammond* a young man developed as a penalty for having executed the sexual act eleven times within eight hours—only the first three times with ejaculation—immediate and rapid epilepsy, and permanent impotency. The paralysis of the lower extremities which the writer saw in a woman under similar circumstances was probably hysterical. Into the debate whether excessive intercourse is capable of producing in both sexes more or less permanent inflammatory conditions or in other words organic troubles I cannot enter here.

ture. Perhaps because it was thought self-evident that no man would come near his wife while she is menstruating. The Mosaic law goes even so far as to speak of capital punishment in connection with the matter and though it may not be proved that such punishment was ever carried out it is plain as we read in *Ploss* and *Bartels* work that the menstruating woman has always been and still is to some extent considered as unclean. According to the law-book of the Mohammedans the husband who has connection with his wife while she is menstruating loses the faculty of mental repose. The menstruating woman occasions also other troubles, endangers vegetation, etc. Hence the regulation among several nations commanding women to undergo a definite purifying process after the cessation of menstruation.

But there are in my opinion besides the belief in the injuriousness of sexual intercourse during menstruation, which acts in many parts as the only deterrent, other reasons as well why cohabitation should be suspended during the periods. There is, primarily, the hurt to the æsthetic feelings in the presence of disagreeable often malodorous coagula adherent to the genitals. More important still is the necessity of sparing the female organs at a time when they are as a rule subject to increased sensitiveness and diminished resistibility. How little consideration many individuals show in this respect I can tell from a good many confessions made to me by sensual men who have during menstruation sexually treated their wives not much differently than at other times. I have no hesitation from the hygienic point of view in declaring intercourse during menstruation as generally unpermissible even if the continence necessitated by this injunction should extend over periods as long as a fortnight or in other words over the half of the sexual interval.¹ It must not be inferred however that I regard it as a calamity if, as it often occurs, intercourse happens

¹Without regard to the still debated point whether the sexual instinct of healthy women is more pronounced during or shortly before and after menstruation or if modesty prevents them from owning to it. (*Ellis, v. Krafft-Ebing.*) That menstruation in women must not be compared to the rut of animals has already been mentioned.

unknowingly to take place simultaneously with the commencement of a period or if a period which is considered to be at an end is resuscitated by a sexual act. The less so as the interesting controversy whether menstrual blood can act injuriously on the male urethra is probably in spite of opinions to the contrary decided in the negative. My own experience that what we meet with in such cases are no more than harmless and insignificant complaints arising from a non-virulent urethritis, is in accord with the opinions of various gynæcologists and urologists. Thus *v. Zeissl*, *Sims* and *Finger*¹ emphasise particularly the disinclination of mucous pseudo-gonorrhœas resulting from intercourse with menstruating or leucorrhœic women to assume any chronic forms or further development.

Conduct during pregnancy.—The sexual hygiene of the married state during pregnancy which if noticed at all receives but scanty consideration in text-books and manuals, is not less important than that during menstruation. On the contrary, it deserves even greater attention seeing that on account of the much longer duration of the period in question there is a correspondingly greater danger of undesirable conduct on the part of the husband arising from the enforced continence. A new element of risk is moreover introduced in the shape of miscarriage which is a source of peril to the health of the mother and to the life of the fœtus though there is perhaps a certain exaggeration in connection with the subject. The want of unanimity in the opinions on the matter is apparent on the one hand from *Kleinwaechter's* demand that intercourse shall be restricted and in the second half of the pregnancy

¹*Finger* demonstrates in his well-known work "Blenorrhœe der Sexual-Organen" (5th edit. Leipsic Vienna 1901) peculiar bacilli enclosed in round cells as the possible cause of the mucous discharge. *Bockhart* and *L. Casper* also believe in a bacterial origin ("Bacteriorrhœa"). The occasional chronicity observed by *Diday* and *Lyon* is probably as *Raciborski* truly says due also to other causes. What I have seen in connection with intercourse during menstruation and with women suffering from non-virulent catarrh have always been acute processes. Often enough there is nothing else noticeable but a few transparent filaments in the urine which occasions very little inconvenience, a condition resembling that which is often caused by frequent sexual intercourse. Where there is no gonococcus there can be no danger in this respect.

abstained from altogether, and on the other from the suggestion which *E. Fraenkel* makes in his recently published book "*Hygiene des Weibes*" (*The Hygiene of Woman*) Berlin 1903, that there ought to be no connection between husband and wife during the last few weeks of pregnancy on account of the danger of introducing into the vagina micro-organisms likely to lead to inflammatory troubles. These are enormous differences which it is difficult to reconcile and against which I am not in a position to advance a definite proposal. I consider however, to be brief on the point, that an abstinence during the whole second half of the period of pregnancy is likely to be to some husbands a very serious matter and one involving the happiness of many a married couple. For this reason I have made it a rule to advise my patients under ordinary circumstances to abstain from intercourse entirely beginning with the sixth or seventh month. This restriction of which libidinous husbands will often enough take no notice leaves in my opinion sufficient room for individualistic dispositions to assert themselves where particular conditions of ill-health do not necessitate a different conduct. With this part of the subject however I am not dealing now as it does not belong to the present chapter. A predisposition to miscarriage may at times form an absolute prohibition. That intercourse during pregnancy is, as regards man, not to be looked upon under all circumstances as an unnatural proceeding is admitted even by *Ribbing* who is otherwise so very cautious. But he advises very great care and especially so in the case of first pregnancies. This means in my opinion not only a restricted number of single acts but also a more gentle and careful manner of performing each one. Referring to what has been said above I should like to mention here that in advanced pregnancy people often adopt for intercourse the lateral position without taking first the doctor's advice.¹ In con-

¹Occasionally it is done with the wife sitting somewhat elevated. The practitioner need not regard this position which approximates connection in the standing position as impermissible, considering the exceptional circumstances, provided care is taken not to subject the pregnant abdomen to pressure.

trast to this cautiousness and consideration for the wife I wish to call attention to the brutal habit of some husbands—"unfortunately very frequent" (*Hegar*¹)—who make voluptuous use of their pregnant wives in the usual way up to shortly before their confinement. How different were the customs of various ancient nations! The Persians f. i. prohibited sexual intercourse with the pregnant wife under penalty of corporal punishment. The Talmud also declares copulation in the first 3 months after conception as deleterious both to the pregnant woman and the fœtus, and later intercourse is characterised as an action which is destructive of human life. In China total abstinence is one of the first medical laws (*Ploss and Bartels*). In many places pregnancy is like menstruation looked upon as a state of uncleanness requiring separate accommodation. Finally it is worth mentioning that to some sensitive and "æsthetic" natures (as I can testify from personal experience) the roomy secreting vagina and the œdematous vulva are in themselves sufficient to deter them from cohabiting with their pregnant wives. As regards the acquisition of urethritis in consequence of intercourse with the pregnant wife (*v. Zeissl* and others) the same may be said as with regard to connection during menstruation.

If I do not see any objection to allowing my patients under ordinary circumstances to cohabit with the pregnant wife beyond the middle of the period of pregnancy it is as I have already indicated principally on account of the attitude some husbands would adopt if compelled to abstain for too long from sexual intercourse. The "concession" is the more reasonable as in accordance with the advice I am in the habit of giving with reference to the abstention during the period of involution the time of continence extends over several months. So as to make it clear what such a long continued absence signifies and in order that it may be appreciated fully I consider it advisable to give here a brief summary of the much discussed question of the "consequences of sexual continence" and of the many contradictory opinions concerning the

¹Der Geschlechtstrieb. Stuttgart 1894.

same, while referring for further details to my several other contributions on the subject.

Sexual abstinence.—I have now for a number of years on the strength of personal observations, which are no longer limited in number, and at the risk of being regarded as a sermoniser opposed most strenuously the belief in the injuriousness of sexual continence which was inaugurated chiefly by the teaching of *Lallemand* and is unfortunately still very prevalent among doctors and the public. Many eminent men are at the present time in agreement with me and I have only to mention such names as *Ribbing*, *Hegar*, *Eulenburg*, *Loewenfeld* and *Rohleder*—all these authorities have dealt with this interesting subject most minutely¹—to demonstrate the progress of the principle that the control of the sexual desire within wide limits is not only permissible but even necessary from the hygienic standpoint, in spite of its being admittedly a powerful natural impulse. There are of course gradations. One case may require the declaration that absolute suppression of the desire is a harmless measure, that so-called “diseases of abstinence” are invented, though readily believed and thoughtlessly repeated, stories (*Ribbing*, *Eulenburg*), another the mere refusal to attribute to abstinence the causation of more or less serious disorders. (*Löwenfeld*.) Personally I have always listened skeptically to the tales of my patients assigning all sorts of conditions such as spermatorrhœa, impotence, neurasthenia, hysteria, hypochondriasis,

¹*Curschmann*, *Forel*, *Mendel*, *Hoerschelmann*, *Blessig*, *Masing*, *Assmuth*, *Jos. Mayer*, *Herzen*, and many others have also worthily participated in establishing the true hygienic conclusions demanded by science and morality. I may also call here attention to the recent order from the Prussian Minister of Education to the Directors of the Universities requiring them to warn the students against the dangers from venereal diseases, considering that a step is thereby taken in the direction of having the subject elucidated by experts from the ethical point of view. The instruction of young men on the subject of illegitimate sexual intercourse and of its dangers is one of the finest and most beneficent objects of medical societies. In a “warning” issued by the “German Society for the Prevention of Venereal Diseases,” which has just reached me I read in the first paragraph that sexual continence is in the unanimous opinion of the medical profession generally, not injurious to health, as it is commonly believed. This applies to women also. *B. Kroenig* and others.

to their sexual abstention exclusively, and I can hardly remember a single case of a healthy individual in whom I could discover no other cause but continence for conditions of ill-health. People do occasionally complain of discomfort, of a feeling of pressure or of tension ("spermatic impulse"); but these inconveniences are easily overcome and without masturbatory "correction." It must be admitted however that there are some sensually inclined and neuropathically predisposed persons whose history does contain serious symptoms of sexual neurasthenia.¹ But I think it necessary to emphasize that the medical practitioner should not in the presence of such patients give way to useless over-confidence. Often enough it is not the continence which is responsible for the illness, but masturbation and lasciviousness, though not to such an enormous extent as is assumed by *v. Gyurkovechky*. The self-regulating action of normal emissions—a subject which is in my opinion far too little appreciated in medical literature—should also be borne in mind. Finally, as *Hegar* says, the sexual desire in present-day civilised people, and especially in women, is not by any means as intense as it is described. Let the reader note the courageous struggle of this expert against the pernicious doctrine of *Bebel* that it is dangerous to suppress natural desires and that it is ordained that man should not leave unused any portion of his body or resist the gratification of natural require-

¹I am obliged to recognise that the literature on the subject does include comparatively reliable cases of serious mischief resulting from continence (thus one fully reported by *L. Casper* of ejaculatio ante portas) and that highly authoritative experts such as *v. Krafft-Ebing* (*Psychopathia sexualis*, 12th edit. Stuttgart, 1903) and *v. Schrenck-Notzing* (*Die Suggestionen therapie bei Krankhaften Erscheinungen des Geschlechtssinnes*. Stuttgart, 1892) believe in continence as a cause of serious affections and even of sexual perversity. But I look upon such cases as exceptions confirming the rule. And as to "diseases of abstinence" in women, even *Krafft-Ebing* considers them a myth. As a matter of fact those times have long since gone when "old-maidhood" and its peculiar disturbances used to be ascribed to absence of sexual intercourse. Neither does it appear that celibates and others who are vowed to chastity are more prone to neurasthenia. The platonic love of adolescence may be an "absurdity," but, as *Moll* says (*Die conträre Sexualempfindung*, 3d edit., Berlin, 1899, and *Untersuchungen über die Libido sexualis*, Berlin, 1897) it is just capable of conquering the "detumescent" desire which is the more serious part of the sexual instinct.

ments. I cannot allow a comparison between the sexual desire and the above indicated natural instincts of hunger and thirst, such as is often made, because food and drink are vital necessities under any circumstances. If the parallel is to be continued, there is perhaps more justification in a reference to drunkenness and to the struggle against the abuse of alcoholic liquors.

On the whole, while not exactly of the opinion that disorders due to continence are entirely non-existent, I have no hesitation in agreeing with *Curschmann* that genuine cases are very rare. Where such are credibly alleged, artificial irritation must be supposed to play a very important causative part in the majority of them. As to the rest, "it is possible for sexually normal individuals whose resistibility is not diminished by sexual abuse, to endure permanent continence along with a well-regulated mode of life without any ill-effects that are worth mentioning." (*Löwenfeld*.)

This explains why, in spite of occasional "conflicts of duties" (*Stintzing*) I have never dared to recommend sexual intercourse to young men and also why I oppose so emphatically the "connection cure" advised by other medical men, advice which *Rohleder* characterises as unscrupulous.

In returning after this digression to the subject of the sexual hygiene of married persons during pregnancy I repeat that the medical demand of abstinence during part of the period is, after what has just been said, the more reasonable as it is only relative continence which comes into consideration.¹ Of course we must not forget that there is an aggravating element in the matter, namely the former regular performance of the sexual act and the fact established by experience that sexual abstinence, when compulsory, is more difficult of practical realisation than when self-imposed or voluntary. (*Rohleder*.) The above mentioned exceptions are doubtless seen by practitioners to a great extent after sudden dissolutions of marriages through the death of husband or wife especially

¹I wish to mention the prohibition of intercourse in various forms of disordered potency, where prolonged continence, extending over one or more months may be remarkably beneficial.

where there is increased sensual proclivity and associated with it a corresponding sexual faculty. On the other hand there are cases, as I have often been told and not only by elderly couples, where the conjugal intercourse has for years been restricted to an unusual or even unseemly degree. But while there is no difficulty about these cases, in the others the doctor must be prepared to grapple with the hard task of compulsory continence, though the latter is to be a temporary one only. Much may be done in this respect by the occupation of separate bedrooms, and by increased mental and physical work on the part of the husband.

There remain however, even if the cessation of intercourse during pregnancy is permitted to be postponed in the sense of my concession, not a few cases—and this is the sore point in the whole question—where obedience to the doctor leads to the adoption of devious ways. Having had occasion for many years to see what is going on behind the scenes, I may say that of the tragedies not infrequently met with by the practitioner as results of an unrestrained sexual nisus those oftenest seen are: secret adultery on the part of the husband, masturbation and onanism performed by the wife on the husband. I do not believe however that the wife, whose occasional inclination to self-help where the husband denies her even a reasonable amount of gratification I am not prepared to deny, ever gives way to masturbation while in a pregnant condition. She rather tends to be grateful to the husband for the forbearance with which he treats her. As to the attitude of the practitioner with regard to the question of the gratification of the husband's desire elsewhere, I should not waste any words on the matter if I had not absolute proofs of the laxity of some doctors on this score. I pity the medical man who does not at all times remember the great significance of adultery, an offence neither required by hygiene nor sanctioned by society and which is moreover in some countries punished with imprisonment. For the rest, I consider the other aids mentioned above also reprehensible, but where the dilemma is otherwise insolvable they are to be regarded as the lesser of two evils, though every effort must be made to check them.

It is better to permit natural intercourse even in highly advanced pregnancy, rather than a deviation from the correct attitude.

Conduct during the period of involution.—In view of the above remarks it is not necessary to say very much on the sexual conduct rendered hygienically imperative by the puerperal condition. I do not of course mean here child-bed in the sense generally attributed to the word by the laity, that is the average week or two spent by the puerperal woman in bed, though according to *Hegar* even during this short period “beastly transgressions” do occur. I mean a period of involution extending approximately over 6 weeks, though it certainly cannot be said that it is absolutely necessary in every case to wait so long—that is, not only until there is no sign left of the lochia but until the wife is able to resume her former mode of life—before intercourse may be indulged again. A great deal depends on such fluctuating factors—easily influenced by the sexual act—as lactation, the involution of the genital organs, or the whole constitution of the mother with its eventual new duties necessitating greater cautiousness. Referring to what I said above on the conflict of the indications I do not see anything objectionable or unhygienic in the doctor’s permission where favourable circumstances warrant it, to resume the marital relations one or more weeks earlier.

There are no special instructions necessary with regard to conjugal connection after miscarriage, in view of what has already been said. They are easily inferred from the contents of my detailed remarks on pregnancy and menstruation. As to more serious pathological conditions, their consideration is beyond the scope of the present chapter.

Preventive measures.—The preventive intercourse of married couples in relation to sexual hygiene, especially as practised at the present day, makes great demands upon the attention of the medical practitioner. This is not the place to prove its justification. Suffice it to say that if we cast a glance at the married state in its different aspects as one of the factors concerned in the progress of a nation, if we bear

in mind the prolonged period during which woman retains her conceptive faculty, if we think of the widely fluctuating uncertainty as to the consequences of normal cohabitation with respect to the question of offspring, and if we also take into consideration what has been minutely dealt with in these pages, it is impossible to issue a general prohibition. This does not however imply complete indifference to the interests of the State which requires a constantly increasing population on the basis of legitimate marriages. It does not mean a refusal to recognise the dangers associated with an exaggerated adoption of neo-malthusian principles. Let me at once say that so far as I am concerned I share at present the views expressed more than 20 years ago by *Hasse* (alias *Mensinga*) in his researches on optical sterility, and those of the Munich neurologist *Löwenfeld* who has recently thrown so much light on the subject. "I claim for every medical man who is a true friend and counsellor to his patients, the inalienable right and duty to utilise his own personal observation and conscientious knowledge with a view to fixing the limit of procreation in every given case, and to act accordingly." "Malthusian measures become a necessity sooner or later to every married couple where the wife retains her conceptive faculty and the husband does not consider that he has an incontestable right to gratify brutally his sensual desires without regard to the weal and woe of his partner and of the children already born." More or less similar opinions are held by *Hegar*, *Eulenburg*, *Rohleder*, *Stille*, *Freud*, *Thompson*, *Volkman*, *von Oefele*, *Ferdy* and many others. I do not propose however to go into the question whether the increase in the artificial prevention of conception is to be regarded as a "sign of decadence" or rather as an "uplifting of the level of our moral decay."

That the safest remedy, one which never fails, namely absolute sexual continence during the whole of married life, is out of the question I need not dwell upon.¹ We have there-

¹Besides refusal on the part of the husband, who is the more interested party, and besides such untoward results as onanism and adultery, the unsatisfied longing of the wife for normal intercourse also deserves mentioning in this connection.

fore to consider a modified form of conjugal connection. I will only mention in passing the injunction that no intercourse should take place for two weeks after and 3 or 4 days before menstruation. It is not likely to do more good than the instruction that the wife shall "remain cold" during the act, and so prevent by her passive attitude the reflex forward movements of the seminal fluid. The attempts to press out the semen by abdominal pressure immediately after intercourse, as practised especially by poor women in Italy, or to "shake it off" by other muscular action as it is done f. i. in Australia (*Ploss* and *Bartels*) can hardly be regarded as hygienic proceedings, and far less can we consider as such the custom, prevalent particularly in France and in the northern countries, of digitally compressing suddenly the posterior male urethra shortly before ejaculation. There remain therefore for serious discussion as hygienic precautions, the interrupted act, the irrigation of the vagina after intercourse, the introduction into it before connection of semen-precluding apparatuses (occlusive pessaries) or germ-killing antiseptics, and finally the condom. The almost endless use of all these preventive agencies also by married couples, of course by mutual pre-arrangement, does no longer justify us in passing over the subject in silence.

Interrupted intercourse.—Upon this subject of interrupted coitus (*Congressus reservatus*, *Onanismus conjugal*)¹, that is the withdrawal of the penis at the decisive moment, I have already on several other occasions given my opinion. That the practice if carried out for years is capable of producing a certain disturbance in the natural course of the mechanism of excitation² and therefore an injurious counter-effect upon the centres of innervation cannot altogether be denied². But we must not forget that ejaculation does take place nevertheless and there is consequently a consummation of

¹Strictly speaking, the vice attributed to Onan, of biblical times, was not masturbation, but interrupted intercourse committed with his sister-in-law.

²*Eulenburg* attaches greater importance to the "prevention of the evolution of the automatic-reflex chains of excitation," whereas *v. Kraftt-Ebing* thinks more of an imperfect depletion of the genital sac.

the orgasm equal to that of normal intercourse, particularly where there is "a little assistance."¹ And as the last word is always spoken by clinical experience, the question can only be answered practically and empirically and I must therefore upon the basis of numerous and constantly growing observations repeat that I cannot, generally speaking, impute from a hygienic point of view any serious harmlessness to interrupted intercourse. I have seen cases in which sexual-neurasthenic symptoms have become more and more aggravated through a lengthened perseverance with the practice. But in opposition to these I have seen far more numerous others in which incomplete connection has been indulged in for many years without leaving behind any recognisable ill-effects, of either a subjective or objective nature. I also have reason to suspect that interrupted intercourse is capable of causing considerable aggravation almost exclusively in such cases where there is already an irritable weakness of the nervous system. It is the excess which is injurious and not the "unnaturalness" of the single act; and the habitual practice has therefore the effect of causing the glimmering nervous disease to flare up the more quickly.

Similar views are held by *Beard*, *v. Gyurkovechky*, *v. Kraft-Ebing*, *Oppenheim*, *v. Hösslin*, *Rohleder* and *Löwenfeld*, except that they differ somewhat with regard to the frequency and intensity of the undesirable consequences. *Thompson* denies all injury to the nervous system of the man through interrupted intercourse. I wish to call special attention to a valuable contribution of *Löwenfeld* in which this author gives a table of 50 cases (men and women) seen by him in which he very rarely found the cause of disease to lie exclusively in interrupted coitus.

¹This does not of course apply to the custom, frequently observed in Italy, and mentioned by *Barucco* in his "Sexual Neurasthenia" (3d edition, German translation by *Wichmann*, Berlin, 1899) of prolonging the sexual enjoyment by repeated interruptions of the act even with repeated erections. It cannot be denied that this is a pernicious vice which should on no consideration be tolerated by the medical practitioner. On the other hand, there are frigid-natured individuals who require considerable time for the exercise of the sexual act, without in any way injuring their organism. A gentleman once told me that he frequently indulges in smoking and reading while thus engaged.

Von Krafft-Ebing has established out of 114 cases only one of marked nervous debility, and even in that one there was a neurasthenic predisposition.

On the other hand there are opponents to this opinion whose positive experiences we are bound to respect. Whereas *Freud*¹ ascribes to interrupted connection the production of a state of anxiety especially in neurasthenic and hysterical individuals (neurotic anxiety), *Bergeret* and *Peyer* infer from their observations an excessively frequent causation of sexual neurasthenic conditions, especially involuntary spermatorrhœa and even posterior urethritis. *Eulenburg* who has seen conjugal onanism produce serious forms of sexual nervous debility is not quite opposed to the idea that it may also give rise to local organic diseases of the genital organs especially in the wife, agreeing in this respect with *Kisch* and *Valenta*. Finally *Hirt*, *Barucco*, *v. Tschich*, *Gattel*, and others impute to the habit considerable importance as a disease-producing element.

In order to find some sort of compromise between the diverging opinions I should feel inclined to believe that the last named authors have accidentally come across a larger number of unfavourable cases. Anyhow I am not in favour of a general matter-of-course prohibition on the part of the medical practitioner. Each case should be decided on its merits. It is also worth remembering that where, as it frequently happens, the wife experiences no orgasm even with the intercourse fully accomplished she is no worse off when the act is interrupted. Considering how enormously frequently abortive forms of precocious ejaculation occur among the men of our present day I attach no importance to it. *Loewenfeld* is quite right when he says that most wives are contented with a very moderate amount of sexual enjoyment in their married state. That the habit of interrupted intercourse could lead a wife to unfaithfulness is not impossible but it is not likely to happen often.

The reliability of interrupted connection as a means of preventing conception though by no means insignificant is on the

¹Die Sexualität in der Aetiologie der Neurosen (Wiener klin. Rundschau, 1898.)

other hand certainly not absolute. I have heard quite a number of confessions that owing to a miss on the part of the husband the pre-arranged plan to confine the number of children to one or two has been frustrated. Not everybody is capable of sufficient self-control especially when under the influence of the powerful sensual emotion.

To sum up I look upon interrupted intercourse as the simplest preventive measure but it is neither harmless nor reliable enough to justify its being recommended as the best in all cases.

Vaginal irrigations and antiseptic introductions.—As decidedly less reliable we must regard vaginal irrigations with antiseptic solutions and the introduction into the vagina of suppositories or small sponges,¹ etc. impregnated with disinfecting substances. The complaints which have reached me to the effect that neither most carefully executed and almost fatiguing syringing nor the latest Parisian Safety-Spongelets have succeeded in warding off most undesirable events are too numerous for me not to offer the strongest opposition to contrary assertions. *Rohleder* hits the mark when he speaks of Unsafety Spongelets (*Unsicherheits-Schaemmchen*).

As to the effect of vaginal powder-insufflators I cannot speak from experience but judging from the opinions of others I very much doubt whether they are capable of killing the spermatozoa absolutely. Not a few women especially nulliparæ consider all these proceedings as "horrid," others owe to them more or less serious complaints.

Occlusive pessaries.—I have almost exactly the same opinion with respect to occlusive pessaries though they as well as remedies of the last-mentioned group are free from the occasional inconveniences of interrupted intercourse. In any case I think they show very little consideration to the wife's comfort. I cannot possibly enter here into a detailed description of the various

¹Perhaps better results may be expected from the remedy recently recommended by Feibes under the name of "Protector" as a prophylactic against infectious venereal diseases, with which we are not concerned here. It reminds one of a lubricant (*Catheterpurin*) and it possesses on account of its high percentage of salicylate of mercury really excellent antiseptic properties without being markedly irritant.

apparatuses. I have repeatedly seen modifications of the well-known and ingeniously constructed occlusive pessary of Mensinga-Hasse (rubber hemisphere with steel ring) but they all suffer from the defect as pointed out by *Kisch* and others that their introduction requires as a rule a skilled hand¹ and that they easily get out of position. For this reason I agree with *Rohleder* in not considering this reliability as favourable as is assumed by some even experienced gynæcologists. My own statistics confirm this though they are of course based on failures complained of. Some of my patients have as a result of the constant manipulations acquired painful and persistent inflammations of the adnexa. If *Ribbing* who also considers these apparatuses unreliable and injurious thinks that most educated European women feel grieved at being regarded as objects of voluptuousness he certainly goes too far, seeing that in the vast majority of cases the precaution is made use of after a full mutual pre-arrangement. I do not take here into consideration the sick wife and her privileges. Most serious consequences may have to be apprehended in her case.

Condom.—The condom is on the contrary relatively the most perfect anti-conceptual remedy and is inferior in simplicity to the interrupted form of intercourse only, a not very serious disadvantage. But it is obviously on account of its comparative trustworthiness—it is only those condoms which are made of poor material that frequently leave one in the lurch—of its most perfect harmlessness to both partners and because of its considerate nature with regard to the wife as well as of its relatively cleanly manipulation generally that it has achieved its present enormous popularity.² As to its composition and

¹I have just had brought under my notice a new preservative constructed by Weissl, the introduction of which may be "learned" by the wife under the guidance of the doctor, although it appears to me somewhat complicated (speculum, rubber plate with spring and impregnated cotton wool tampon).

²So as to give a drastic idea of the extent of the practice I may reveal that ladies belonging to the highest classes frequently bring to their husbands enormous quantities when returning from the various watering places, especially in foreign countries; even clergymen ask their medical advisers for the necessary sources of supply, and—*horribile dictu*—not infrequently have I seen the things scattered about when taking a walk in solitary places. I do not believe that most of these preservatives are used for the prevention of

technique or as to its examination I cannot enter here into details; those who require information on the subject are referred to the circumstantial account of *Rohleder* (l. c.) in connection with the observations of *Ferdy* and containing also some remarkable additions of his own. I must however protest against the condemnation of rubber condoms in favour of so-called cœcal condoms and must state definitely that I have hardly ever heard of any disturbing or injurious effects in connection with the use of the former, particularly as regards the perfectly finished, thin and yet entirely resistible preparations. I admit that not a few husbands or wives find the degree of excitement is considerably diminished and the duration of the act prolonged¹ but the majority declare that it is not markedly different "from before." This discounts somewhat the assertion of *Beard* that interrupted and condomated intercourse are equal in their effect and that they are both much more injurious than frequently exercised "normal" intercourse. *Loewenfeld* also does not hesitate to give to the condom the preference over the other anti-conceptual procedures. Even *Barucco* who is against occlusive pessaries and other preventive measures considers the condom as the least injurious appliance.

On the whole, having some years ago expressed the opinion that those who suffer through performing interrupted intercourse should use condoms I have now to modify my view in so far as to declare the latter method absolutely preferable to the former.

On the other hand I have never hesitated in condemning unrestrictedly the so-called "exciting condoms." There are probably few medical men who would not turn away in disgust from

infectious venereal diseases. In any case the condom is at the present time a very considerable factor in the preventive intercourse of married people and one with which the practitioner has to reckon. If he refuses to give his advice in these hygienically important matters, who else shall give it?

¹This is probably the reason why some husbands apply the apparatus shortly before ejaculation without apparently suffering in any material degree from this combination with interrupted intercourse. I wish, however, to warn against the use of "glans condoms," which are reputed hardly to interfere with the sensation. All those which have been brought under my notice have proved unreliable in consequence of their instability.

—or dare to recommend—these apparatuses which are not meant to serve any other purpose than to increase the sexual pleasure and are for this reason retailed secretly and in an underhand way.¹ It does not alter the case in the least that similar exciting arrangements (ampallangs) are used for the same purpose by various wild and more civilised tribes in the shape of prickly apparatuses and even of bristles attached to the perforated penis. (*Ploss and Bartels*.)

General hygienic measures.—With these observations I might very well conclude my remarks if I did not think it advisable to mention at least casually a few more general precautionary measures which are of decisive importance in the sexual hygiene of the married state, particularly where gradual transitions to real pathologic changes in the sexual functions of the active man become noticeable. With these changes themselves I am not dealing at present but I refer especially to inclinations towards the so-called occupational and psychical (moral) or hypochondriac and relative potency. It is therefore far from my purpose to enter into a discussion of the necessary therapeutics and of the various electrical, hydropathic and other “anti-neurasthenic” establishments.² On the other hand I believe I am right in laying stress—apart from the necessity of daily cleanliness as a procedure calculated to be beneficial in the sexual hygiene of the married state—upon two powerfully efficient factors namely travelling and muscular exercise.³

¹I think I ought to mention here the attitude of *Adler* on the titillatio clitoridis by the husband in cases of dyspareunia. He considers this remedy, which *van Swieten* is said to have recommended to the Empress Maria Theresia with success, as permissible advice. I am not inclined to absolutely contradict this author, who takes a serious view of the practitioner's duty, especially as he restricts the treatment to suitable cases and demands tact and corresponding intimacy between husband and wife, but I am rather afraid that it is in substance nothing but an onanistic manipulation on the part of the husband on his wife.

²The physical treatment of such cases of potency as well as the dietetic is elaborately dealt with in the recent work of *Goldscheider* and *Jacob* and in that of *v. Leyden* and *Klempner* just issued, respectively.

³The separation of young husbands from doubtful company, the discontinuation of the reading of pernicious literature, the abandonment of lascivious recollections, and so forth, I take, of course, for granted, especially where excessive intercourse and its dangers are threatening.

Holidays.—These are especially as conducted now-a-days in combination if at all beneficial as hygienic measures particularly so, if suitably indulged in, in just those cases becoming more and more frequent where potential disturbances not immaterial to either husband or wife are being prepared by mental diversions especially such as are constantly created by the unhygienic life in large towns. Where the mental activity and the moral exertion necessitated by ambition, want or passion either in business, scientific pursuits, artistic work or other vocations are over-employed there is not much left for the sexual intercourse of marriage. It is in such cases as stated also by *Eulenburg* and *v. Gyurkovechky* more or less emphatically that travelling shows most excellent results; not fatiguing travelling but comfortable and enjoyable journeys to pretty places without books or other material of study. The “*procul negotiis*” is indeed an essential condition if the hitherto “neglected” wife is to be made happy on these excursions, if the diligent scholar, the sedentary and meditating lawyer, the over-worked medical man or busy merchant is to regain the affection of his life-partner whom he is taking to foreign climes, to the delights of nature or to the joyous bustle of the world without. The new impressions, the relaxation, the pleasure of fresh society and last but not least the table d’hôte in conjunction with a moderate allowance of alcohol will do the rest. Though under ordinary circumstances the medical practitioner should not be at all lax in this last respect and though he should warn against over-indulgence which is particularly harmful in sexual hygiene he will not do wrong in such cases to allow a little latitude of golden indiscretion.¹

Muscular exercise.—Of the various forms of muscular exercise, walking, mountain climbing and gymnastics are for obvious reasons the most frequently used. I cannot however resist the temptation to say a few words of praise in favour of cycling, a fine sport not as yet sufficiently cultivated, provided of course it is carried out within hygienic limits. It is just because it

¹It is hardly necessary to draw attention to the high degree of harmful sexual desire engendered by alcoholic excess, especially when in the form of drinking bouts. (*Eulenburg*.)

enables the cyclist to cover long distances by easy muscular exercise and thus get into the fresh air that it is so vastly superior to indoor gymnastics and automobilism. In addition to this advantage which fosters courage and self-reliance it possesses the unique merit—and this brings it into touch with my present subject—that as first pointed out by *Bertz* in his “Philosophy of Cycling” it produces a sub-division of activity in the cerebral centres of the cycling brain-worker. Finally, cycling is easily and quickly learnt even by elderly people, as I can testify from personal experience.¹ Its disadvantages especially with regard to sexual hygiene have been unduly exaggerated.

Psychical treatment.—As regards finally the attitude of the physician in the presence of light manifestations of purely psychical disturbances of potency and their allied forms to which young and newly married people are as is well known so much subject, it is well to remember that a few rational, firm and sympathetic words of encouragement accompanied by a little pertinent information are very often sufficient to re-establish confidence in one's own capability and self-reliance, and to avert unhappy marriages, childlessness or divorce proceedings. On the other hand we must bear in mind the experience already mentioned that on account of the peculiar whims of sexual life not infrequently prohibition of conjugal connection is followed by most satisfactory results, inasmuch as the young husband who possesses the necessary self-confidence violates the prohibition. His imagination however must be kept free from sexual affairs.

But no matter whether there are such frequently seen troubles or whether normal circumstances prevail, the husband shall as *Ribbing* puts it request as a favour and not demand as a right sexual connection with his wife; provided always that the latter is sufficiently considerate to her life-partner in taking into account his moral and hygienic privileges and in her contributing her share to render their joint married life a happy and harmonious union.

¹For details see my article “Appreciation of cycling from the medical point of view,” *Deutsche Aerzte-Zeitung*, 1900, No. 17.

VII

Menstruation, Pregnancy, Child-bed, and
Lactation in Relation to Marriage

VII

MENSTRUATION, PREGNANCY, CHILD-BED, AND LACTATION IN RELATION TO MARRIAGE

By **Professor R. Kossmann** (Berlin)

The most important work on the diseases of women which has been preserved to us from ancient times, that of *Soranus of Ephesus* says: ἡμεῖς μέντοι κατὰ φύσιν ἴδια πάθη λέγομεν γυναικῶν οἷον τὸ συλλαμβάνειν καὶ ἀποτίκτειν καὶ γαλακτοουργεῖν, εἰ ταῦτα βούλεται τις τὰ ἔργα πάθη προσαγορεύειν. "We call such special diseases of women "natural" as f. i. conception (pregnancy) childbirth and the secretion of milk provided such functions can be at all called diseases."

It is therefore seen that there were already thousands of years ago men who knew that the distinction between what we generally call "normal" (or physiological) and "pathological" is not identical with the distinction between health and disease. There are "natural" conditions in the normal course of a woman's life which may well be called diseases because they are unavoidably associated with pain and functional disturbances or at least with diminished resistibility. To these belong as *Soranus* correctly says pregnancy, childbirth and lactation but we may also add to the list child-bed and menstruation, the latter of which is κατ' ἐξοχήν called by the female sex "being unwell." That these "physiological diseases" their influence upon the married state and the influence of the latter upon them deserve a special chapter in this work the reader will readily grant.

Menstruation.—Beginning with menstruation we find that even where the phenomena associated with it do not exceed the normal limits there are still a number of symptoms which

may be regarded as a disordered state of health or at least as disturbances of the subjective condition. Before the commencement of the sanguineous discharge the woman experiences pain (although moderate in degree) in the loins and in the back, a sensation of heaviness and downward pressure in the abdomen, tension in the external genitals and often also in the breasts. All this is produced by a congestion of blood which is easily visible and which causes a tumefaction of the labia, vagina, uterus and breasts and is most probably also the reason of the increased blood pressure in the ovaries which causes the Graafian follicle to burst. Accompanying these symptoms there is an increased irritability of the vasomotor and often also of the sensory nerves, an excitation of the sexual faculty and a depression of the mental condition. Even if we admit that this change in the subjective state has reached its modern average extent by the pampering of our race it is yet evident from what we observe in mammalian animals that the main troubles connected with menstruation are unavoidable and normal. It would seem that the congestion in the generative organs is necessary for the purpose of liberating the ovum from its follicle and of fixing it in the uterine mucous membrane; the increase in the sexual desire towards the end of menstruation assures in animals the exercise of copulation at a time most favourable for the impregnation of the ovum and is in man probably an inheritance from his animal ancestors; the mental depression, finally, and the nervous irritability are possibly caused by the unnatural sexual abstinence which has become a human institution through the dictates of religion or morality. We are therefore justified in looking upon these disturbances in so far as they do not exceed materially the average condition as *κατὰ φύσιν πάθη*, as physiological ailments, so that though they are morbid phenomena in the sense of this book they yet require to be considered as a particular group distinct from genuine pathologic disorders.

Concerning the importance of menstruation in the married state the fact just mentioned that sexual intercourse is by established custom suspended during menstruation forms the principal factor. As the sexual desire in the woman is increased towards the end of menstruation this sexual abstinence is

undoubtedly a proceeding antagonistic to the natural instinct. Though it is in accordance with universal custom and though it is even declared by the Parsee, Mosaic, Mohammedan and possibly also other religions as a divine commandment this is probably a result of the view prevalent among the ancient civilised nations that the menstrual blood and consequently the menstruating woman is unclean. The old Parsees used to confine their menstruating women in closed rooms so that they should not come in contact with other people; the Jews were not only prohibited from having intercourse during menstruation this being a criminal offence punished with the death of both parties, but the couch of a menstruating woman and everything that came in contact with it were also considered unclean. (3. Mos. 15. V. 20-23.) The Chinese and Japanese have similar customs and the same may be said of almost all half-civilised races. Numerous notices exist on the subject as f. i. in the work of *Ploss* and *Bartels*. (*Das Weib in der Natur- und Voelkerkunde*. 7th edit. Leipsic, 1902. I., pp. 420 sq.)

Even scientific Medicine adapted itself to this view and came to look upon the uterus as an organ of excretion whose function consisted in eliminating the injurious products of metabolism; hence the classic designations of what we call to-day "menstruation" as "*τέ καθαρσις*" and "purgatio," (menstrua), which have retained their equivalent in modern languages under the name "monthly cleaning." Most extraordinary notions of the dreadful poisonousness of the menstrual blood penetrated from the popular superstition of oriental nations into the writings of *Plinius* and *Columella* and from these into the medical literature of the middle-ages. Seed coming in contact with menstrual blood was supposed to turn barren; fruit would drop from the trees against the foot of which a menstruating woman had been leaning; knives would get blunt by being breathed upon by them; mirrors tarnished if looked into by them. The rabies of dogs was attributed to the partaking of menstrual blood. The fermentation of new wine was sure to be interfered with if a menstruating woman entered the cellar. (This superstition is still prevalent in the Rhine district and also in other parts.) Finally intercourse with a

menstruating woman was supposed to be productive of leprosy.

Such deep-rooted superstition, to which was afterwards added the disgust of sensible men at sullyng their bodies with blood, resulted in spite of the indifferent attitude of the Catholic Church (the moral theology of *Alphonse of Liguori* permits distinctly intercourse with a menstruating woman) in establishing abstention during the monthly periods as an universal practice.

Marriage must take this into account. Hence the fairly general custom of arranging the wedding-day on a date not very far removed from the cessation of the preceding menstruation. The neglect of this precaution may lead to most disagreeable mental depressions by compelling the newly-married people to abstain from intercourse at a time when the sexual excitement is at its highest.

It is of course questionable whether this abstention is in reality an hygienic necessity or only a very ancient mistaken prejudice. There are weighty reasons in favour of the latter alternative. That the rut of animals corresponds to human menstruation in its main points, that is, in the periodical congestion of the genital organs and the bursting of the Graafian follicle, can no longer be denied as it was formerly done.¹ But in animals which possess a rutting period intercourse takes place just during such period and in most of them during such period only, as at other times the females experience no sexual desire and do not exercise any attraction upon the males. Even if we ignore the Darwinian theory altogether we cannot quite conceive how an homologous process could take place in homologous organs of most living creatures naturally and even necessarily as a means of propagating the species, and yet that the same process should in the case of the genus homo only be unnatural and injurious. Moreover, the instinct which compels rutting animals irresistibly to copulate is almost without an exception present in women in the form of a distinctly increased sexual desire, though like all other human instincts it is successfully combated by various psychical and somatic inhibitory processes.

¹(Editor's Note: Compare this with p. 225 in the article by Prof. Fürbringer, Chapter VI.)

It would be remarkable in the highest degree if we really had before us a natural desire distinguished by its exceptional character of a normal instinct which it is injurious to gratify. Such an hypothesis wanting both in analogy and probability cannot be accepted as indisputable on the strength of religious commands, or popular beliefs, but requires most careful examination. Such an examination is in so far of considerable importance from the point of view of the married state as it is quite possible and from a comparison with other numerous animals even probable that the sexual frigidity of so many married women, which is so disturbing an element in the reciprocal relationship between them and their husbands and often a cause of conjugal unfruitfulness, is only an extra-menstrual one. In cases where there is reason to suspect such a state of affairs the practitioner will perhaps do well to encourage an attempt in this direction. The æsthetic dislike of a possible pollution with blood can be removed by a suitable lukewarm irrigation. Experiments on animals and observations in man have shown that the highest point of the sexual desire is reached towards the end of menstruation—it might therefore be advisable to prefer that part of the period. This question is moreover of importance perhaps from another standpoint as well. As has already been mentioned it is usual with many women to exhibit towards the end of menstruation a noticeable or even a very disturbing mental depression and a marked disagreeableness of temper. The inference is therefore justified as indicated above that this disturbed condition is not unconnected with the suppression—demanded by custom—of a natural desire. Therefore in marriages where these disturbances threaten to assume considerable proportions an attempt at intramenstrual intercourse would also be indicated.¹ In any case the practitioner should make it his duty, whenever the opportunity arises, to instruct the husband as to the naturalness and necessity of the nervous irritability during menstruation. The closely intimate relations between

¹See footnote, p. 225, in the article of Prof. *Fürbringer*. I must adhere to these views with regard to the rut of animals and intercourse during menstruation, opposed though they are to *Fürbringer's* opinions. No one who regards the periodical hyperæmia and the bursting of the Graafian follicle as the main essence of menstruation can deny its identity with the rut of animals.

two individuals who must be indulgent to and understand each other, if the marriage is to be a happy one and, on the other hand the monotony of the wifely duties connected with the household, cannot help being a plentiful source of conflicts during this period of irritability, and the practitioner should inform the husband that he must endeavour to avoid these conflicts. He must treat his menstruating wife as if she were recovering from some slight illness, that is, he must attempt to diminish the extent of the house-duties, he must keep from her worry, bad news or sorrow, he must not retort on occasional outbreaks of unjustified irritability but rather avert them good-humouredly. It is almost always during menstruation that the first clouds appear on the matrimonial horizon; the husband who is aware of the importance of these "critical days" will know how to take the necessary means for their prevention.

Pregnancy.—We will now consider the second of the physiological diseases, namely pregnancy.

If pregnancy occasions in woman a certain amount of bodily suffering, this is principally due to the fact that the fœtus lives as a parasite at the expense of the mother, that it consequently draws from her the entire material required not only for the formation of its own body (with the exception of the impregnating germinal cell) but also for her own metabolism. There is thus caused in the first instance a more or less complete exhaustion of the reserve substances stored up in the maternal body, and secondly an increased demand of nourishment and of oxygen. The necessary consequence of the satisfaction of this demand is an increased activity on the part of the digestive and secreting organs—the stomach, the intestines and the kidneys. There is further developed in conformity with these increased requirements an automatically working correlation between certain organs which causes the heart of the pregnant woman in particular to perform a greater amount of work. Finally pregnancy creates disturbances of a purely mechanical nature. The increasing weight of the pregnant uterus interferes with the movements of the body and is a constant burden to the dorsal region. The greater voluminousness stretches the abdominal walls, causes sub-cutaneous ruptures in them, produces an

over-tension in the abdominal muscles which prevents a re-establishment of their original tonicity, while the abdominal pressure is during pregnancy diminished. The bladder is also encroached upon and its capacity decreased; there is an increased pressure upon the intestines and especially upon the rectum the function of which is rendered more difficult; the sympathetic ganglia in the abdomen are irritated through the tension and displacement of the mesentery. Finally the intra-abdominal pressure occasioned by the crowded state of the organs hinders the return of the blood into the large abdominal veins and produces a congestion in the regions supplying them.

It is certainly true that the organism is capable of adapting itself to a certain extent to these purely objective changes in the conditions. Nevertheless this is only partly the case, and it is more difficult to draw the line where the phenomena cease to be normal and begin to become morbid, than even in pregnancy. The increased consumption of the reserve material is bound under all circumstances to diminish the resistibility of the body against injurious influences. As a matter of fact it is well known that pregnant women possess a lesser resistibility against diseases of all kinds. The necessarily increased consumption of food and of oxygen easily produces digestive disturbances, and physical exertion especially in climbing even if it does not greatly exceed the normal allowance is apt to give rise to a dilatation of the left ventricle. But where the quantity of food consumed or assimilated is not sufficient to compensate for the greater expenditure, the nutrition of the body suffers, emaciation and hydræmia (serous plethora) appears in spite of the attempts of the organisms at compensation, as proved by an increase in the number of white corpuscles in the blood (physiological leucocytosis of *Virchow*.) The overloading of the blood with the end-products of the metabolism of two individuals, the maternal and the fœtal, is capable, where the activity of the kidneys is somewhat diminished although they act otherwise perfectly normally, of producing albuminuria on the one hand and uræmia on the other. We may here probably also look for the indirect cause of accumulations of pigment—consequent on the destruction of a large number of red blood-

corpuscles—present not only in the areolæ of the breasts and in the linea alba under normal circumstances but also very often, and sometimes with disfiguring results, under the name of “Chloasma Uterinum” on the faces of pregnant women. The increased demand on the striped muscles of the body arising from the growing weight of the pregnant uterus lowers the working ability of the woman and soon causes, where the amount of work performed cannot be reduced below the usual quantity, overfatigue and its consequences. The slow action of the bowels produced by the overtension of the abdominal muscles and the compression of the rectum increases the inclination already existing to digestive disturbances, interferes therefore with the assimilation of food and deteriorates the quality of the blood. The diminished capacity of the bladder occasions subjective discomfort but interferes also with sleep and is under our modern arrangements which do not provide sufficient opportunities for women to satisfy immediately the desire to micturate a source of considerable inconvenience. The increased pressure upon the abdominal veins causes varicosities and œdemata especially in the genitals and in the lower extremities. It is not only the sympathetic centres which become irritated through mechanical causes; several of the disturbances mentioned and particularly the indigestion, the exhaustion through insufficient food and through hydræmia, the retention of injurious substances in the blood through deficient action of the kidneys combine among themselves and also with purely psychical influences and thus give rise to considerable nervous disorders. Among those which are so frequent that they are often regarded as unavoidable and non-pathological symptoms are the irritability of the vaso-motor nervous apparatus which shows itself chiefly in the form of palpitation, congestion, giddiness and syncope; the increased sensibility of the cutaneous nerves; nausea and frequent vomiting; functional disturbances in the Organs of the Senses (amblyopia, partial deafness, perverse sensations of taste and smell, hyperæsthesias and anæsthesias). Even without any demonstrable special predisposition or without any demonstrable complications of the pregnancy there may occur also psychical derangements, principally in the form of

marked psychical irritability depression and melancholia or in the shape of perverse longings, (*κίσσα*, or "picca" of the ancients) which cause a detestation of ordinary food and a desire for most unpalatable things.

All these disturbed conditions which, though not by any means natural, are nevertheless exceedingly frequent accompaniments of pregnancy, are of enormous importance to the married state. Where a marriage has been contracted in the expectation that the wife will participate in the earning of the livelihood, pregnancy compels her at least during a part of its duration to desist from such participation wholly or partly on account of her diminished working ability. But even the fulfilment of the ordinary house-duties devolving upon the majority of wives may become so difficult that the household is bound to suffer. The lesser resistibility against disease often renders the wife totally unable to do any work and even necessitates attendance upon her on the part of other people. Moreover the psychical irritability on the one hand and the depression or possibly the melancholia on the other make her more or less incapable for other work also besides mere mechanical duties. The proper supervision of the entire household, the firm but just management of the domestic servants, the resolute bringing up of the children, the considerate and patient treatment of the husband who comes home tired from his hard daily work; all these conjugal duties which are no doubt of the highest importance may suffer considerable neglect in consequence of such psychical disturbances of pregnancy.

Against all these facts stands out prominently the circumstance that the procreation of children is from the standpoint of morality as well as from that of patriotism the main object of marriage, and that maternal happiness is under anything like normal conditions the highest and most ennobling sentiment of woman. For this reason conjugal pregnancy ought never to be renounced willingly and on account of the disadvantages and dangers mentioned above. It so happens moreover that such a renunciation is only possible by abstaining from sexual intercourse altogether or by the adoption of certain measures preventing conception. But such an abstention is apart from

the above indicated moral and patriotic motives very much to be deprecated. Woman is seldom so frigid as to desire sexual continence or even to be indifferent in the matter—even if she maintains this to be the case. She will generally regard her husband's abstention as a serious neglect, will direct her attention to other men and may even be driven by circumstances to commit adultery; towards her husband she will become careless and inconsiderate. As far as he is concerned, it is relatively seldom that he will abstain from sexual connection entirely;¹ in most cases he will look for it elsewhere, and thus be misled into neglecting his home and leading a dissipated life; this would tend to undermine his health upon which the welfare of his family depends. And as regards anti-conceptual procedures, it may be said that those which are in any way reliable are absolutely injurious to health because of the abnormal congestion in the genital organs and of the excessive irritation of the nervous system which they produce, and also because the gratification required for the removal of that congestion and for the appeasement of that irritation—that is the ejaculatory act in man, and peristaltic movements in the uterus and in the tubes—is delayed or even absent altogether.² The preventive

¹Compare this with p. 225 in *Fürbringer's* article. I am in complete agreement with *Fürbringer* and the authorities he quotes in so far as they consider sexual continence in man in no way injurious to health. But most married men, accustomed as they are to a regular performance of the sexual act, will find it impossible to break with the custom suddenly and for any length of time.

²See p. 233 in *Fürbringer's* article. As regards the congressus interruptus, it is not likely to be injurious to the husband if it is exercised in such a way as to permit ejaculation to take place; in this case, however, it often misses its object, as the interruption occurs too late. As to the wife, the interruption will certainly do her no harm if she is of a frigid temperament, but I consider it very harmful if in the case of a wife who is not frigid the interruption takes place before the orgasm has reached its highest point. I have very often been able to remove quickly hyperæmia, leucorrhœa and nervous depression in married women by prohibiting interrupted intercourse. Concerning the condom, the diminution in the pleasurable sensation which it causes varies in different individuals; however, this diminution is sometimes very considerable, and in such a case, especially if it affects only the husband or only the wife, the remedy is certainly also injurious, both to the bodily and the moral constitution. As regards the other preventive measures I am in full agreement with *Fürbringer*.

measure which consists in restricting the intercourse to the third week after the commencement of menstruation is probably the only one which has not these disadvantages; but the question arises whether this partial continence would not have in many marriages almost the same results as those mentioned above.

There remains therefore for the amelioration of the injurious accompaniments of pregnancy nothing but a rational hygiene of pregnancy. What this hygiene dictates is clear from what has been said. In the first instance it is evident that a marriage which depends on the constant physical employment on the part of the wife is wrong in principle. There is every justification for the proposal to introduce legislation restricting the employment of pregnant women in certain trades, and the idea of a pregnancy-insurance which shall enable pregnant married women to receive during their pregnancy amounts corresponding to their loss of wages deserves every encouragement. It were highly desirable that such amounts should include also stated sums for the purpose of providing the pregnant woman with some domestic assistance, so that she should be spared such hard work as carrying coal or water, etc. where she is in the habit of doing so under normal circumstances. There is also great necessity to protect pregnant women against infection and against the vicissitudes of the weather. Where there is a predisposition to certain diseases and especially to affections of the kidneys, lungs, heart or the nervous system a suitable prophylaxis must be instituted and where symptoms of these diseases have already made their appearance the required treatment must be undertaken with particular care or the pregnancy determined if the necessity arises. As to what "necessity" means in this connection there is no unanimity of opinion. The law-books do not contain any definite enactments declaring when the induction of abortion by medical men is exempt from punishment. The Catholic Church has only recently condemned artificial abortion under all circumstances even where it is the only means of saving the mother's life. Most German doctors however consider it permissible or even indicated as a life-saving remedy. Some go even so far as to demand it in cases where there is danger of considerable aggravation of a somatic or

psychical disease in a pregnant woman. Under such circumstances every practitioner must for the present be responsible to his own conscience for the decision to be taken in every single case.¹

Considering that the object of marriage is not the procreation of descendants of any kind but of vital descendants who shall in their turn be capable of propagating the race, the artificial determination of pregnancy has also been recommended in cases where on account of the physical or mental suffering of the pregnant woman it is reasonable to expect sickly and inferior children. It is certainly true that the prevention of an inferior progeny being brought into the world would prove of enormous benefit to the national welfare but one would rather look for the realisation of this ideal in a restriction of marriages than in artificial abortion. As long as our moral and religious views do not permit an interference on the part of the State with the personal right of everyone to choose husband or wife, artificial abortion on account of the presumably poor quality of the fœtus in utero is absolutely out of the question.

As regards the hygiene of the mind it is principally the husband who must attend to it. Good-natured passive resistance in the presence of outbreaks of ill-temper on the part of the pregnant wife; reasonable personal attention to the wants of the household and family where everything suffers in consequence of ill-management; avoidance of all psychical irritation and mental overexertion through quarrels, exciting literature, heated discussion, theatre-going, concerts, big parties (especially at the pregnant woman's house), irregular meals and late hours—all these points are of the greatest importance. In the case of melancholic depression the best remedy is for the husband to express heartily and frequently his joy at the approaching increase in the family and his gratitude to the future mother. The knowledge that the endurance of the unavoidable drawbacks of pregnancy is a necessary accompaniment of an important duty and that it is being rewarded with love and thankful-

¹Translator's note. The general practice in England in such cases is to have a consultation with another medical man before arriving at a definite decision.

ness, acts beneficially even in the case of women in whom an hereditary predisposition or complicating diseases are the cause of the psychical disturbance. It is also worth remembering that in some women melancholia arises from a feeling of shame at the ungainly physical alteration in the figure and that an aggravation will naturally be caused by any apparent neglect on the part of the husband. In such cases the latter must continue to observe most carefully the former relations and affect a certain tender and chivalrous conduct towards the pregnant wife. As to the utility or injuriousness of sexual intercourse during pregnancy opinion is not by any means undivided but experience seems to teach us that it is not necessarily harmful. It must of course be abstained from where there is a tendency to miscarriages or in the last days of pregnancy, when there is a risk of premature rupture of the membranes. When it is exercised all violence must be avoided, and it may also be necessary, especially where the rotundity of the abdomen is well-marked, to choose some other suitable position, as f. i. the lateral one. In view of the circumstance that many pregnant married women consider themselves slighted by their husbands' continence, and that on the other hand, such continence is frequently a cause of marital infidelity and possibly therefore also of the introduction of venereal diseases, the practitioner will do well to be very guarded in ordering sexual abstinence during pregnancy, and to restrict the injunction to such cases where it is absolutely necessary.

Child-bed.—We come now to the consideration of the puerperium which has without question, if not in regard to its origin at least in that of its course, even where the latter is normal, the character of disease in its state of convalescence. As it is a convalescence from a traumatic injury the same method of treatment applies in the case of the puerperal woman as in that of recovery from any other injury and it is therefore not necessary to discuss the same on this occasion. But we are not concerned here even with those special measures indicated in the case of every puerperal woman, whether married or not, and will only consider them in so far as they apply exclusively to the married state.

That a large number of illegitimate births take place in hospitals, schools of midwifery or nursing homes is an undoubted fact. And if according to present statistics the mortality in German maternity institutions is as high as, or even somewhat higher than, the general mortality of puerperal women, the reason is that the institutions are debited also with a not inconsiderable number of deaths of married women who are sent there on account of anticipated dangerous complications during labour or because they are already severely infected or injured. That under similar circumstances the danger connected with the process of child-birth is at the present day smaller in the case of pregnant women entering institutions early enough than it is in those whose confinements take place at their own homes, can hardly be open to any serious doubt. The possibility of thorough asepsis in the case of the former, the proper supervision of midwives and attendants, the more complete selection of instruments and apparatuses ready at hand, the better accommodation and lighting arrangements, and the constant presence of properly trained medical officers—all these advantages tend to make the conditions in suitable establishments vastly superior.

Nevertheless such establishments are only very rarely made use of by married women. In the first instance on account of the impossibility to fix with certainty the date of the expected confinement, the pregnant woman must necessarily enter the institution many days and perhaps weeks before the anticipated event, otherwise she runs the risk of being taken by surprise while yet at home. She must consequently spend there a considerable time for no purpose especially if the confinement is delayed by several weeks as it often happens. Not only the expense connected with such an arrangement, but the long separation from home and her duties while she considers herself as yet equal to fulfil them to a great extent is doubtless sufficient to act as a deterrent. Those who cannot afford to pay for a separate room at some establishment do not care to occupy a bed in a large ward containing perhaps inmates who are not suitable company for respectable women. It so happens therefore that the considerable advantages of child-birth and child-bed at suitable institutions are available for married women to

a slight extent only. The homes for parturient women founded since 1887 in various places and particularly those which, like the first home of the kind erected in Mannheim, are intended absolutely for married women only have introduced a great change. They offer to women in labour and in the puerperal state all the benefits mentioned above, they admit women in poor circumstances without any payment and they have only the one drawback which is not in reality without its advantages to the pregnant woman herself that they take her away from her household which very probably suffers through the absence of its supervising head even if she were to direct it from her sick-bed. Where a fairly reliable substitute is available the accouchement and puerperium in such an institution should be recommended to future mothers as preferable from every point of view. There are in many places charitable societies whose object is the provision of such substitutes as f. i. in Berlin the society "Hauspflege" (Sub-division of the Berlin Women's Society). Unfortunately however it is only poor women who are thus looked after; considering how difficult it is for well-to-do families also to find a reliable substitute for the house-wife it is very necessary that similar societies be formed for the purpose of recommending respectable persons to those able to pay for their services.

But even where the puerperal woman remains in her own home such a reliable substitute is very desirable seeing that—and herein lies the great difference between married and unmarried parturient women—the mother is always running the risk of re-commencing her household duties and her attendance on the older children to an extent not commensurate with the state of her health. It is particularly the nervous system which suffers, and it may even lead to mental disorders; vexation and annoyance may also result in her leaving the bed too soon if she notices that her authority does not go beyond the door of her sick-room, and that everything outside it is in wild confusion.

But also where the substitute cannot replace the housewife in her duties and privileges particular attention must be paid to the increased nervous and psychical irritability of the puerperal

woman. The husband must keep from her as far as possible all the troubles and worries that he encounters.

Finally as regards sexual intercourse, most races and especially also the religions of the semitic nations consider a woman during the lochial discharge just as unclean as when she is menstruating, and conjugal connection at that time is therefore prohibited; on the other hand the Catholic Church (*Alphonse of Liguori*) permits it. Whereas I regard the prohibition during menstruation with somewhat critical doubts, I consider intercourse during the puerperal state, which is unfortunately more frequent than one would imagine, as absolutely reprehensible. The existing hyperæmia of the genitals is thereby considerably increased, greater or smaller labour-wounds are opened afresh, new injuries are easily caused owing to the laxity of the mucous membranes, opportunities are created for infections to make their entrance, the nervous system of the wife is violently disturbed, and often a feeling of disgust and aversion at the husband's embraces is thus instilled into her mind.

Lactation.—In considering finally the suckling act or lactation, we find in it also phenomena which are to a certain extent characteristic of disease. The secretion of the breasts withdraws from the body a considerable amount of nourishment, and sometimes a part of its reserve material, so that it becomes less capable of performing its functions, and even more or less cachectic. It also becomes more susceptible to certain diseases, and less resistive against pulmonary phthisis in particular. Lactation inhibits the functions of the ovaries and makes thus a woman for the time being sterile, and if continued too long, is often capable of producing considerable atrophy of the uterine walls. Painful tension in the breasts compels frequent application of the child—about every 3 hours—or relief by other means; the mother is thus tied to her child, she cannot leave her house for long without it and is thus incapable of seeking either work or amusement outside. Frequently a permanent loss of beauty is also feared, and not without reason, for the tense virginal breast with its small nipples remains after lactation flaccid and the nipples considerably larger.

In the unmarried woman these disadvantages are, at least in Germany, amply compensated by the advantages which she gains in becoming a wet-nurse to other mothers' children. This is not the case with married women; but they also derive great advantages from lactation; there is the saving of the high wages and of the keep of a wet-nurse, and where there is no intention to engage one, the avoidance of the many more or less serious ailments to which infants are subject when brought up on animal milk-mixtures or vegetable substitutes. An important advantage of lactation also lies in the possibility to resume sexual intercourse while it lasts without there being a probability of a speedy new pregnancy supervening. The disadvantages, not only pecuniary but also sanitary, of frequently successive pregnancies can therefore be avoided with a fair degree of certainty if the mother suckles her own child. Finally it is worth mentioning that suckling causes contractions in the uterine muscles and that it assists thus greatly in effecting a return of this organ to its normal conditions.

It follows from what has been said that lactation is one of the conjugal duties which ought never to be neglected for the sake of the retention of external beauty or haply from considerations of amusement. Only where the health of the mother or child suffers, that is, where it exhausts the former or does not sufficiently nourish the latter, lactation is to be desisted from.

But on the other hand it is a dereliction of conjugal duties to prolong lactation beyond the proper term to the detriment of the suckling for no other purpose than the avoidance of subsequent pregnancies. It is generally about the 9th or 10th month in the life of the child that the latter begins to require more food than is contained in its mother's milk. From that time onwards it should therefore be given other nourishment, but its occasional application to the breast in addition is not contra-indicated, provided there are no conditions of ill-health present in the mother.

VIII

Constitutional (Metabolic) Diseases in Relation to Marriage

VIII

CONSTITUTIONAL (METABOLIC) DISEASES IN RELATION TO MARRIAGE

By **Professor H. Senator** (Berlin)

We call here constitutional or metabolic diseases, a group of chronic affections of the entire organism which manifest themselves by definite disturbances in the metabolism or by general disorders of nutrition in the absence of any local or primary organic disease. Where such organic disease does exist, however, it is clinically eclipsed by the nutritional and metabolic disorders in question.

This group of diseases cannot be sharply defined, or separated, particularly from the diseases of the circulating fluid which supplies all parts of the body with the material serving for their nutrition and acts as the medium of interchange between nourishment and metabolic products. There are consequently certain—primary or secondary—diseases of the blood in which the process of metabolism and the entire nutrition of the body suffer to a very great extent, so that one or the other of these conditions of ill-health may be included in the one group just as well as in the other, if we do not altogether prefer to combine both these groups into a single one.

On the other hand, it is evident, that where the whole organism is affected all individual organs must also be affected more or less. These organic troubles are in their turn capable of giving rise to such disturbances that the general state of nutrition becomes of secondary importance as compared to the clinical aspect of a particular form of disease which may present the characteristic features of organic disease rather than those of a constitutional affection. Examples of this sort we have in rickets and osteomalacia, diseases which are undoubtedly based upon a disordered nutrition and metabolism but in which the

affection of the bones and the troubles arising from it are such prominent features that there is as much justification in classing them among the diseases of the bones and organs of locomotion as among those of metabolism. Considering that in their relation to marriage it is almost exclusively the local lesions produced by the diseased conditions of the bones which come into question, and not the general disturbance in the nutrition, they will be dealt with in another chapter of this work—among the diseases of the organs of locomotion. The same thing applies to Graves's disease, sclerodermia, etc. The former doubtless presents changes in the metabolism, but it is doubtful whether they are primary and whether they constitute the whole characteristic combination of symptoms. It is the nervous element which plays the most important part in this combination especially with regard to the conditions of married life, and for this reason it seems more appropriate to include exophthalmic goitre among the nervous diseases than among the constitutional diseases. As to sclerodermia the most prominent symptom of which is constituted by the appearance of the skin, it will receive consideration among the diseases of this organ.

The diseases of the blood, in a more restricted sense, that is the conditions which are characterised mainly by alteration of the blood and by an inclination to hæmorrhages, will likewise receive consideration apart from the diseases of metabolism proper, and be more suitably treated as a special group.

We shall therefore devote attention in this chapter to the following: Diabetes mellitus with which it is usual to associate diabetes insipidus although the latter is most probably the result of a disturbance in the distribution of the watery element based on nervous influences rather than that of intrinsic changes in the metabolism. There also belong to this group: Gout (arthritis urica), obesity (adipositas universalis) and Dercum's disease (adipositas dolorosa), myxædema, acromegaly, Addison's disease, and scrofula.

I. Diabetes mellitus.—This disease doubtless deserves the first place in connection with the subject which interests us here.

Before entering into details, it is necessary to point out that

although as is well known, the diagnosis of diabetes mellitus rests upon the presence of sugar in the urine and can be confirmed by this test only, it does not by any means follow that every discharge of sugar (especially that of grape-sugar in the urine) must be regarded as a sign of diabetes. For there are various other conditions in which sugar appears in the urine—though only temporarily—so-called glycosuria or mellituria, the different forms of which it is not the object of this chapter to enumerate.

Glycosuria in pregnancy and child-bed.—We will only mention here the elimination of sugar, not dependent on diabetes, which occurs during pregnancy and child-bed. There are two forms of it, namely:

1. *Lactosuria*, a discharge of milk-sugar in the urine which makes its appearance as a rule a few days after labour and in rare cases shortly before it. It results from a congestion and absorption of the milk-sugar from the mammary glands, and is therefore noticed particularly in strong individuals with insufficient elimination of milk.

2. *The glycosuria of pregnancy*, in which the urine contains grape-sugar as in diabetes mellitus, but only in small quantities, not exceeding as a rule more than 1%. The frequency of these glycosurias is differently stated, and this may be accounted for either by the circumstance that the methods employed for quantitative tests were of unequal strength or by the fact that the pregnant women examined used different forms of nourishment. It has been proved that the tolerance of pregnant women for sugar and other carbo-hydrates, that is the limit up to which these articles of food are assimilated after their introduction into the stomach, is often an exceedingly low one, and it is therefore conceivable that the urine should exhibit different conditions varying with the diet of the persons examined and with the greater or smaller amount of carbo-hydrates generally, and sugar specially, consumed by them. It is perhaps thus that we can explain the widely diverging statements of *Brocard*¹ on the one hand, and *H. Ludwig*² on the

¹Comptes rendus de la société de Biol. 1898 I p. 1077.

²Wiener klin. Woch. 1899 No. 12.

other. The former found among 125 pregnant women in their 7-9 months of pregnancy that half (50%) of them showed sugar in the urine, and almost in every case grape-sugar; the latter detected fermentable sugar in the urine, and in most cases only a few times and in insignificant quantities, in no more than 18 out of 82 pregnant women (22%).

Neither the glycosuria nor the lactosuria of pregnant and puerperal women cause any complaints; they are both physiological processes which may at the utmost be regarded as inclining to the border of the pathological domain, but they nevertheless deserve, and the glycosuria more than the lactosuria, every attention from the medical man, who if he will not immediately conclude the presence of diabetes will at least have reason to recommend caution for the future to the pregnant woman in question. Because, since this glycosuria is probably the result of a diminished power of assimilating sugar, it might occasionally constitute the beginning of a genuine diabetes, especially if it occurs not only after the consumption of sugar (as "glycosuria e saccharo") but also after that of starchy food (as "glycosuria ex amylo" of *Naunyn*) or if there are also other factors present that predispose to diabetes, especially, for instance, an hereditary predisposition.

From what has just been said we may draw the conclusion that the medical man will do well, even where pregnancy takes a normal course, to periodically examine the urine for sugar and to advise accordingly.

***Influence of marriage on diabetes mellitus.*—**

Coming now to diabetes proper, we have first to consider the question, as laid down in the introduction, whether this disease can be influenced by marriage, and especially whether the individual suffering from it may expect in consequence of his or her marriage an improvement or an aggravation in the disease or a shortening in the duration of his or her life. In other words: Are there conditions created or altered by marriage which have an influence one way or another upon the course of diabetes?

Experience has shown that the course of diabetes, apart from complications and general circumstances of importance

in every chronic disease such as nutrition and strength, depends in the first instance upon its form. It is well known that there are milder and severer forms of diabetes according to the tolerance for carbo-hydrates, although the latter does not supply an absolutely safe criterion. The reason for this lies chiefly in the fact that it is not possible to draw the line between the two forms with respect to the ability to assimilate carbo-hydrates, and also because transitions occur from the milder to the severer form as do also changes in the condition of the same patient. It is of importance to remember that it is very frequently possible by suitable treatment and especially by a correct diet to increase the tolerance for carbo-hydrates and thus to ameliorate the course of the disease. Such treatment and the hygienic life connected with it are however very expensive considering that they must be resumed or modified periodically and repeatedly, and they can only be indulged in successfully where there is a certain amount of affluence and independence in the struggle for existence.

Age is also a very important factor. Generally speaking, the course of diabetes in the earlier years, to about the middle of the third decade, is more rapid and more unfavourable than at a more advanced age.

Psychical influences, especially those of a depressing character such as fright, sorrow, etc. act aggravatingly on the disease and may even, where there is a predisposition to it, *f. i.* heredity, often form the occasion of its origin.

Pregnancy and labour have also occasionally given rise to diabetes or caused it to become manifest for the first time. More frequently these processes lead to an aggravation of an existing diabetes inasmuch as a milder form passes into a severer one owing to a diminution in the tolerance for carbo-hydrates, or a rapidly running pulmonary tuberculosis supervenes which ends as a rule fatally shortly after labour. In other cases, death occurs during child-bed from coma or sudden collapse.

As to how often these processes exert their fatal influence, with what degree of probability the latter may therefore be expected, it is impossible to say, as the number of recorded

observations bearing on the point is far too small to permit even an approximate estimate only.¹

The influence of lactation on the course of diabetes has received even less attention from observers. But with regard to it we may also take it for granted that it has the effect of aggravating the disease, and that where there is a complicating pulmonary tuberculosis, there may arise the greatest danger to life.

From the above remarks we may infer that marriage presents as a rule no particular risk to a man suffering from diabetes, seeing that most men are not too young when entering the married state, and that a rapid course of the disease is consequently not to be feared. But such a contingency might nevertheless happen, when the external circumstances are so unfavourable that the necessary or desirable mode of life cannot be instituted or where intense psychical emotions are produced by pecuniary troubles or other circumstances which tend to mar the happiness of married life.

Where there are such unfavourable circumstances attending a marriage about to be entered into, or where there is reasonable ground for assuming that they will subsequently arise, the medical man's duty is, if consulted on the point, to dissuade diabetic men from marrying; he will do well to offer the same advice in cases where the patients are rather young, or to insist at least that the marriage be postponed till the 30th year has been passed, and the longer the postponement the better.

Where the unfavourable circumstances are not present, there is no fear that marriage will endanger the life or health of a man suffering from a mild form of diabetes, and in so far as these questions are concerned there is no indication to oppose the marriage.

On the other hand, a patient suffering from a severe form of the disease must under no circumstances be recommended to marry, because, even if his condition is not likely to be aggravated by the marriage, he has very little prospect of reaching the natural life-limit. To obtain an approximate idea as to the

¹For opinions on the subject see *O. O. Fellner, Die Beziehungen innerer Krankheiten zur Schwangerschaft*, 1903, p. 229.

seriousness of a case one may, apart from other considerations, study the tolerance for carbo-hydrates. The patient who cannot, on an empty stomach, consume at least 100-150 grammes of white bread or 120-200 grammes of brown bread (60-90 grammes of carbo-hydrates) without showing sugar in the urine in the next 6 hours must be considered as suffering from a severer form.

The conditions are different and more unfavourable in the diabetes of females. In the first instance girls marry as a rule at an earlier age than men, that is at a time of life when diabetes is less benign in its course, so that the probable duration of life is to begin with shortened. For this reason, I think it justifiable in view of the dangers threatened, to advise young girls suffering from diabetes not to marry. Women of more advanced age affected with the disease in a mild form should be told what dangers they are incurring by marrying, and the medical man should even where the circumstances are otherwise favourable give his consent to the marriage only with a certain amount of reservation.

Transmissibility of diabetes in married life.—

A further question is whether husband or wife runs any special risk through the diabetes of the other partner, that is, not only in so far as a chronic disease accompanied by painful or dangerous symptoms is likely to cause suffering and inconvenience to persons living in close intimacy with the patient, but in a specific manner. In other words, can diabetes be transmitted from husband to wife or vice versa? It is some time now since it has been pointed out by various observers that diabetes occurs in married couples, especially by *R. Schmitz*¹ who found among 2,320 diabetics seen by him 26 married couples (1.1%). The same proportion, namely 10 married couples among 900 diabetics, was found by *B. Oppler* and *E. Külz*² who calculated at the same time that 1,169 cases of diabetes reported by other authors included 11 married couples, or a proportion only slightly smaller (0.9%). I have also reported 770 cases of

¹Berl. klin. Woch., 1890, No. 20.

²Berl. klin. Woch., 1896, Nos. 26 and 27.

diabetes with 9 married couples (1.19%).¹ But as my material on that occasion consisted of private patients as well as of hospital in-and-out-patients, whereas the other statistics mentioned included probably patients belonging to the better classes only (such as are in the habit of frequenting the various watering-places) I have now, so as to make comparison easier, compiled a new list of my private patients only, and the latter shows that 892 diabetics include at least 15 married couples (1.6%). This proportion though somewhat higher than the other figures given above is still so small that it does not seem sufficient to support the view that diabetes is contagious.

But *H. Leo*² has protested against this method of calculation which takes into account married and unmarried diabetics together, and he is right in demanding that for purposes of establishing the contagiousness of diabetes the proportionate frequency should be reckoned among married diabetics only and it would then of a necessity appear much higher.³

In addition, there is a number of observations, not very great but yet sufficient to attract attention, of the presence of diabetes among persons not related by blood and not married to one another, under circumstances which suggest the possibility of contagion.

Thus *Teissier* (Lyon) quoted by *Oppler* and *Külz*, reports the case of a laundress 62 years old formerly in good health, (as was also her husband and 6 children), who contracted diabetes after having washed for 6 months the linen of a severe diabetic and that of his granddaughter who was also suffering from diabetes.

More decisive still is his following observation: A gouty man whose mother had died from diabetes developed glycosuria in consequence of intense worry. After 6 months his cook aged 60, who had hitherto been in perfect health, fell ill with diabetes; she had been in the habit of washing her master's handkerchiefs. A sew-

¹Berl. klin. Woch., No. 30.

²Über Wesen und Ursache d. Zuckerkr. Berlin, 1900, p. 86.

³I am sorry to say I have not thought of this point before, and I do not know with regard to many male diabetics whether they were married.

ing-woman, 50 years old, who had been employed in the house for 10 years and who assisted the cook, also sickened one year after her master became ill and exhibited intermittent glycosuria.

Teissier mentions also briefly the case of a coachman who used to wait at table and in whom diabetes was diagnosed shortly after his master became slightly diabetic as the result of an attack of anthrax in the face. Also, the case of a restaurant-proprietor who used to take his meals with his diabetic sister-in-law and who became diabetic after 6 months.

*E. Külz*¹ noticed diabetes in 5 inmates of the same house.

*Naunyn*² saw 3 cases of diabetes in people who lived under the same roof with some diabetics who were not related to them. Among them was the case of a young woman who developed a fairly severe—and probably temporary?—glycosuria after having stayed a few weeks with a diabetic non-consanguineous aunt whose husband was also diabetic. But the diabetes of both hosts was very mild in form, and both were almost entirely, or nearly so, free from sugar.

I have also seen a few cases of diabetes in persons who were not hereditarily predisposed and related, not consanguineously, but by marriage, to diabetics with whom they came in close contact, thus, f. i. in the wife of a man whose brother as also the latter's wife were diabetics.

More remarkable however than all these observations is the following: Dr. H. 42 years old, medical practitioner in a small provincial town with about 2,500 inhabitants, hitherto in good health and not hereditarily predisposed, consulted me in March, 1899, on account of his diabetes which he had noticed shortly after having amputated a gangrenous thigh in a diabetic patient.

¹Klin. Erfahrungen über Diabetes mellitus. Edited by *Rumpf*, etc. Jena, 1899, p. 246.

²*Nothnagel's Spec. Path.* VII., p. 126.

At the same time there were in one single street of the little town 5 more diabetics, namely 4 men of whom one was the proprietor of an inn—which the other three frequently visited, and a woman, the wife of one of these 3 diabetic men.

None of these observations, however, supply an incontrovertible proof of the contagiousness of diabetes. The striking coincidence in these cases might be explained without the intervention of a contagious element by assuming that the presence of the disease, or the occurrence of grave symptoms in one person causes another who has relations with him to direct his attention to the state of his own urine and thereby to discover a diabetes which was already existing previously though perhaps in a latent form only. Or there may possibly be in the case of one or another of these apparently infected diabetics an hereditary predisposition if not to diabetes, perhaps, to some other disease etiologically connected with it, such as gout, obesity, or psychosis, and some circumstance arising from the intercourse with the diabetic, as f. i. mental shock at the occurrence of coma or gangrene, etc. constituted an opportunity for the disease to break out. Finally, one might find the explanation, as I pointed out long since¹ with regard to the then hardly known occurrence of diabetes in married couples, in the circumstance that, if not an absolute coincidence, the same causative conditions produce the same effect in the husband and the wife,—an explanation which received fairly universal assent.

But these explanations are after all nothing but conjectures of which the one may have more and the other less in its favour than the theory of contagiousness. Some of the cases quoted, and particularly the last, are so remarkable that they give food for reflection whether some cases of diabetes are not in reality due to contagion. The attempts to examine this point experimentally have shown that it is not entirely without some justification, but so far they have not led to any definite conclusions.

We must therefore at all events reckon with the remote possibility that where either husband or wife suffers from dia-

¹*H. Senator, Diabetes in v. Ziemssen's Spec.-Pathol. XIII. 2, 1876, p. 122 and 2nd edit. 1879, p. 394.*

betes the other partner may sooner or later also develop the disease. But the degree of probability of this contingency is according to our present experience a very small one, somewhat greater perhaps where the individual as yet free from the disease is hereditarily predisposed to it, but for all that not sufficiently great to justify the medical man in taking special precautions which entail more than a correct hygienic and dietetic mode of life.

Influence on the generative faculty.—In other ways, too, diabetes may have, owing to certain of its peculiarities, an effect upon the course of marriage. *Firstly*, as regards the husband, there may be sexual impotence, a very frequent symptom, which appears sometimes early even in mild forms of the disease and sometimes later in its course, and which can often be removed permanently or temporarily by suitable treatment. *Secondly*, as regards the wife: Besides amenorrhœa and other disturbances of menstruation which are as far as married life is concerned of no practical importance, sterility is frequently seen in diabetic women as a consequence of various causes, f. i. atrophy of the uterus or of the ovaries, prevention of conception through the abnormal constitution of the vaginal secretion, inflammation and ulceration of the vulva and vagina, etc. Where conception does take place, which is frequently the case, the pregnancy is in a considerable number of cases interrupted prematurely, either spontaneously or by medical interference.

And now, in order to save the diabetic wife from the dangers of pregnancy and labour, the question arises as to whether conception shall be prevented. But this is a measure which is connected with so many different circumstances, including some which do not even belong to the domain of the physician, that the latter will be well advised on occasions of this kind to leave the decision to the respective married couples themselves.

Opinion is, however, divided as to whether it is advisable, where pregnancy has occurred, to interrupt the same by the induction of abortion or premature labour, and it is hardly possible here, like in many other diseased conditions to lay down any general rules for the guidance of all pregnant women.

For, as already stated, on the one hand the fœtus often dies and is expelled, making interference unnecessary, and on the other the life of the mother is more and more in jeopardy as the pregnancy advances and labour approaches. The physician will therefore have to take into consideration in each individual case, above everything else, the severity of the disease and the state of nutrition and strength of the mother.

The premature interruption of the pregnancy by the induction of abortion is generally considered to present the best chances for the mother. It is however necessary to ascertain first what value is attached by the married couple or by those who represent them to the advent of the child, as circumstances might necessitate the preservation of its life, though perhaps at the cost of that of the mother. It is therefore advisable in order to guard against future reproaches to leave the decision entirely in the hands of the relatives after having explained to them the probabilities of the case. A safe rule in such cases is to call in a second medical man to share the responsibility.

Influence on the offspring.—Diabetes presents finally a double danger to the offspring. First, because the children of diabetic mothers, though they are often born alive, come into the world in a weak and pitiful condition, and secondly on account of the hereditary character of the disease. For of all etiological factors heredity is the one which is most frequently and most surely demonstrable. Older authors knew already of the occurrence of diabetes in several members of the same family or in several generations, and recently, since the subject has received attention not only with regard to the presence of the disease in parents or in brothers and sisters, but also in more distant blood-relations, the number of cases observed has grown more and more. More than 40 years ago, when diabetes was still regarded as a fairly rare disease *Griesinger* was able to prove heredity in 3 cases only out of 225 observations collected by him (1.3%); but *Frerichs* established hereditary predisposition in 10% of his cases, *Gruber* in 8%, *Teschenmacher* in fully 8%, *Seegen* in 14% and *Bouchard* in as many as 25%. More recent calculations depending on material somewhat similar to each other, that is, with exclusion of hospital in-and-out-

patients, do not reveal such diverging percentages. The figures of *von Noorden* show hereditary predisposition in 18.5%, those of *Külz* 21.6% (150 times out of 692 cases), those of *Naunyn* 17.4% (35 times out of 201 cases), and my own records show decided hereditary or familiar predisposition in 18.6% (166 times out of 892 diabetics). A far higher percentage was found only by *R. Schmitz*¹ in Neuenahr, who established hereditary predisposition in 998 out of 2115 diabetics (47%).

Even if we leave the last figure out of account, the proportion is still high enough to deserve serious consideration. A fifth of all diabetics who are seen in private practice and are presumably part of the better-class population is, at least as regards Germany, most certainly hereditarily predisposed to diabetes. But the proportion among the poorer patients who are seen in hospital practice also seems to be about the same. For various and obvious reasons, the family histories given by this class of patients with reference to diseases in their parents, brothers, sisters or more distant relations are not very reliable; I have nevertheless been able to ascertain hereditary or familiar predisposition in 14-17% out of 79 cases seen at the Berlin University Polyclinic which disclosed any etiological information.²

That diabetes, resting on hereditary predisposition frequently passes over one generation and appears in the third, is well known. But what has struck me is that in such cases the disease often makes its appearance at an early age, and even in very young children. Among 25 diabetic children between 3 and 18 years old, whom I saw in consulting practice, and 13 of whom were boys and 12 girls, there were 7 whose parents were free from the disease, while one of their grandparents had suffered from diabetes. As usual in such young persons, the disease took in all of them a very rapid course, and in one case death occurred within 11 or 12 days.

With regard to the question of marriage and attitude during married life, there are no doubt diabetics who are not altogether

¹Berl. klin. Woch. 1891, No. 27.

²Compare *G. Jablotschkoff*, Statist. Beiträge zur Aetiologie d. Diab. mell. und insipid. Dissert., Berlin, 1901.

indifferent about the possibility of the disease being transmitted to their descendants, but generally speaking not much importance is attached to the point, seeing that the contingency is one to be relegated to the more or less distant future. The physician should however, without pretending to prophesy, express an opinion in that direction if consulted at all in the matter, and endeavour if it lies in his power to avert possible mischief. The precautions which might eventually become necessary in view of the hereditary transmission of diabetes are practically the same as those indicated when the question of marriage arises or as those to be adopted during the married state.

If a viable child is born to a diabetic father or a diabetic mother, it is the duty of the medical attendant to watch it most carefully, and to examine the urine as often as possible, so that in case any symptoms of diabetes should make their appearance, he could at once institute the necessary treatment and endeavour to counteract the disease, if possible. Unfortunately, he will achieve this the more rarely, the younger the child.

On the strength of what has been said above, the attitude of the medical man on the question of the marriage and married life of diabetic individuals may be summarised as follows:

A person suffering from diabetes should be advised not to marry before the age of 30-35.

In a man who has reached or exceeded this age the conditions which render marriage undesirable are: a grave form of the diabetes, permanent impotency and unfavourable external circumstances such as are likely not to be improved or to become even worse by marriage. Where these conditions do not exist, the man must not exactly be advised to marry, but neither must he be dissuaded from doing so. It is, however, necessary to inform him of the dangers which may accrue to his eventual offspring.

Diabetic females who have either reached or passed the above-mentioned age should, where the disease is of a severe type, or where the outward circumstances are unfavourable, be distinctly dissuaded from marrying. Otherwise, and where the person concerned is still of a conceivable age, the doctor must not recommend marriage, but after having pointed out the

dangers arising to herself from an eventual pregnancy, and those threatening her eventual offspring, he should leave the decision to her.

The decision as to whether married couples should, on account of the dangers mentioned above, prevent conception must be left to them entirely.

Where pregnancy supervenes the question whether the same should be arrested deserves to be taken into consideration, and measures will be taken in accordance with the views expressed above preferably in conjunction with a second medical man. It is advisable to examine periodically for sugar the urine of every pregnant woman especially where there is an hereditary pre-disposition to diabetes.

Diabetic women should on no account be allowed to suckle their children.

Finally, it is self-evident that the diabetes of husband or wife must in every case be medically treated, and that those symptoms especially, which act injuriously upon the married state, must also receive most careful attention.

II. Diabetes insipidus (polyuria).—This disease is not frequent, it seldom endangers life, and it is generally accompanied more by inconvenient disturbances than by grave symptoms. For this reason it does not present any special points in reference to the question of marriage and of the married state, and no other significance than that of a minor ailment of indefinite duration. The only element which might come into consideration from our present point of view is that of heredity; but such an heredity has not on the whole been often observed; far more rarely than in diabetes mellitus, and in contrast to the latter, the hereditary form of polyuria does not present any special dangers with regard to the duration of life. There are on the contrary examples that members of families affected with the disease have exhibited as a rule remarkable longevity.¹ From this standpoint neither, does polyuria therefore present any special misgivings.

III. Arthritis urica (gout).— It is necessary to

¹*A. Weil, Virchow's Arch., 1884, Vol. 95.*

remark at the outset, that we are considering here only the so-called real gout, (arthritis urica or vera) and not the allied painful affections of joints or neighbouring tendons and bones, which are often designated by the public as "gout."

Heredity.—The importance of this genuine gout from the point of view of marriage lies almost exclusively in its etiological conditions, and especially in the circumstance that it rests upon heredity more than perhaps any other disease. This fact, which was already known to former generations of medical men, has been confirmed again and again, although the figures at our disposal relating to the frequency with which gout is demonstrable among blood relations do not agree with each other, a circumstance which is hardly surprising seeing how difficult it is to obtain reliable family histories. The proportion varies perhaps in different countries under the influence of climate, race, etc. It is certain that even if we reckon the direct transmission of the disease from parents or grand-parents only, heredity is demonstrable in almost 60% of the cases, and the percentage is naturally greater if we take into consideration collateral lines as well. This applies at least to England, the classical home of gout.¹ In Germany the proportion does not seem to be any smaller, if it is not larger, as *Braun*² says that among 65 gouty patients he did not find a single one who was not hereditarily predisposed. In France the proportion appears to be somewhat less; it is according to *Lecorché*³ 57%, and according to *Pâtissier*⁴ and *Bouchard*⁵ only about 43-44%. Like other hereditary diseases, gout also shows occasionally omissions in intervening generations.

There is, besides, a correlation resting on an hereditary basis between gout and diabetes, of such a kind that the former predisposes as a rule to the latter; very seldom it is the other way. Hence why we oftener see diabetes appearing in gouty families

¹Ch. S. Scudamore, A treatise on the nature and cure of gout, etc.—
A. B. Garrod, The nature and treatment of gout.

²Beiträge zu einer Monographie der Gicht, Wiesbaden, 1860.

³Traité de la goutte. Paris, 1884.

⁴Bull. de l'acad. de Méd., 1840.

⁵Maladies par ralentissement de la nutrition.

or gouty individuals contracting diabetes in addition, than gout added to diabetes. It is worth mentioning that diabetes supervening on gout generally runs a favourable course.

Other etiological conditions.—The hereditary transmission of gout occurs more frequently from the father's side than from the mother's, and this is probably easily explained by the enormously greater frequency of the disease in the male sex. The exact proportion of this greater frequency is difficult to ascertain, because the statements on the subject vary so much, and this in its turn is due to the circumstance that different observers take different views of what arthritis or "gout" is. In women especially, it is a common thing to include among cases of real gout other forms of chronic articular inflammation, such as arthritis deformans. Gout is, according to general experience, principally a disease of advanced age; only exceptionally the disease has been observed in individuals under 25 years of age, or in children, but it appears that such cases may occur, especially in families severely predisposed to gout through a series of several generations.

The occurrence of gout is facilitated by an intemperate and over-indulgent mode of life accompanied by an excess of food and meat in particular, abuse of alcoholic liquors especially certain heavy kinds of wine and beer, insufficient physical exercise and sexual transgressions. It is not possible to state accurately in figures the extent of the influence exercised by each of these factors, and for this reason we attach greater importance sometimes to the one and sometimes to the other. Sexual intemperance may, perhaps, account for the circumstance that gout and syphilis go very often together.

The same factors may, though less frequently, give rise to gout in people who are not hereditarily predisposed to it, and we may add to them in all probability as a predisposing element, chronic lead-poisoning.

The disturbances caused by gout, show with regard to marriage no peculiar characteristics. Acute attacks run as a rule a similar course to that of other acute diseases; after their cessation the individual affected is practically in the same condition as he was before. It is only when the attacks become

very frequent and more and more joints get affected, that is, when the disease assumes a chronic form, that the matter assumes a different aspect.

Chronic gout leads in the course of time to organic changes, deformities in the joints which interfere with their use, disease of the kidneys, of the heart and vascular system, of the liver and other organs; but these sequelæ do not as a rule make their appearance until late in life, seeing how seldom gout affects young persons, so that they hardly ever arise at a time when people are about to marry. But should it happen that a man affected with chronic gout—and in view of what has been said as to the predisposition of the two sexes, it is almost always men that suffer from this disease—is about to enter the matrimonial state, his future wife will have to make up her mind not only that she is not marrying a healthy and vigorous man who will be able to gratify fully her desires, sexually or in other directions, but also that she will probably sooner or later be called upon to assist and nurse her husband who moreover will hardly reach the allotted span of normal life. The same scruples would have to guide the physician in the case of a young man affected with severe gout, a not impossible occurrence where there is a strong hereditary predisposition and injudicious mode of life.

Apart from such cases there is no necessity to oppose marriage where there are no complications accompanying gout; sometimes it might even be advisable to recommend it especially where there is reason to anticipate in consequence of the married state a salutary change in the manner of life of the individual concerned, such as would produce the disappearance of the above-mentioned injurious etiological elements of the disease. From this standpoint it might appear rational to advise young *bon-vivants* especially if coming from a gouty stock to get married.

Regarding the married state it is the duty of the practitioner where either one or both of the married partners suffer from gout, in addition to the necessary treatment to protect if possible the children from the disease or to counteract the same by recommending an early regulation of the whole mode of life in

accordance with the well-known principles relating to the subject.

IV. Obesity (adipositas, lipomatosis universalis) and adipositas dolorosa.—Obesity from the standpoint of marriage is important first on account of its etiological circumstances, and secondly because it occasions a certain amount of disturbance in the sexual functions. On both points it is the wife who is more interested than the husband.

Etiological conditions.—As regards the etiological conditions, obesity rests very often on family predisposition, and is consequently inherited, whilst in a number of cases it appears as an acquired disease. The frequency of inherited obesity is differently estimated, and namely for various reasons apart from the general fallacies which underlie all calculations that depend on family histories. For racial peculiarities and climatic conditions play here an undeniable part probably because certain elements favouring obesity have been inherited through many generations. It is well known f. i. that the women of many eastern nations are very frequently obese, a condition which is not only not undesired but rather looked upon with great favour.

In Central Europe the family predisposition can generally be demonstrated in more than half the number of cases. Thus *Kisch* found in 4,000 cases of lipomatosis universalis 2,235 with such predisposition (about 56%); *Chambers* 22 out of 38 (nearly 60%); *von Noorden* more than 70%, and *Bouchard* on the other hand 31 only out of 86 cases (36%).¹

The predominance of the female sex becomes apparent where there is hereditary predisposition, already during childhood, but still more at a later age, past the prime of life, that is, at and after the climacteric period; in men also obesity is more frequent at more advanced ages than in their earlier years.

In addition to the greater prevalence of obesity among women and older men, there are also a number of other causes

¹E. H. *Kisch*, Die Fettleibigkeit. Stuttgart 1888.—*Chambers*, Corpulence or the excess of fat. London 1850.—*v. Noorden*, Fettsucht in *Nothnagel's* Spec. Pathologie VII. 4. 1900.—*Bouchard*, Ralentissement de la nutrition. Paris 1890.

which co-operate in producing the disease, even where there is no familiar predisposition to it. As such we have to name in the first instance an excessive (i. e., disproportionate to the requirement) consumption of food and especially of such articles of diet which are supposed to form fat or reserve-material, that is, carbo-hydrates, such as farinaceous food and sweets; secondly insufficient physical exercise, by which as it is well known the consumption of fat is diminished; and thirdly a plenteous consumption of alcoholic liquors, seeing that alcohol is a reserve-article for fat. If obesity is noticed more often in wine and beer-drinkers than in those who take spirits it is because that part of the population which furnishes the majority of spirit-drinkers consists as a rule, of people who do not take a great deal of food but who have on the other hand more laborious work to perform than beer and wine drinkers, a circumstance which more than counteracts the influence of the alcohol.¹

Disturbances in the sexual function.—In addition to these three injurious agencies, the first two of which are particularly active in women of maturer age, there is a further powerful factor in the insufficiency or absence of the sexual function.

The importance possessed by the non-exercise of this function in the accumulation of bodily fat has from times immemorial been recognised both in man and animals, and it has recently been confirmed experimentally by modern investigators.² These experiments have proved conclusively that by the removal or destruction of the genital glands—ovaries or testes—a predisposition to obesity is produced.

This phenomenon explains the frequent occurrence of amenorrhœa in obese women, partly also that of sterility and

¹Translator's foot-note: The reader should bear in mind that this passage refers to European continental conditions. The working-classes in England and, I believe, in America also, are not as a rule given to spirit-drinking; it is beer which plays here the principal part. This may however explain why one sees so many more stout people on the continent of Europe than either in England or America.

²Loewy and Richter in *Du Bois-Reymond's Arch. f. Physiologie* 1889. Suppl., and *Centralblatt f. Physiol.* 1902. No. 17.

also probably why in those cases where pregnancy ensues the mammary glands act so deficiently. This deficient lactation is most likely also influenced mechanically by the atrophy of the glandular parenchyma through the weight of the excess of fat.

Another cause of the sterility in obese women is the mechanical hindrance in the exercise of the sexual act and the consequent prevention of conception through the formation of fat-deposits in the external genitals. Irritation of the skin and mucuous membrane near and in the vulva caused by perspiration and friction between the folds of fat (intertrigo, vulvitis, etc.) may have a similar result.

The impotence frequently noticed in fat men probably rests on like causes, namely in the first instance on an atrophy or other kind of degeneration in the testicles resulting in azoospermia, which *E. A. Kisch*¹ found in 9% of the highly obese men whom he examined in this respect. The sexual desire and erective faculty are in such cases as a rule also diminished, and finally there is often a distinct mechanical interference with the copulative act produced by the mass of abdominal fat surrounding the penis. With the improvement in the obesity the sterility due to this cause soon disappears.

Apart from the disturbances connected with the sexual life it is worth noticing that there are also others in direct association with obesity of which the principal are those affecting the heart and vascular system giving rise to dyspnœa and congestive symptoms, and glycosuria which may develop into a regular form of diabetes. The latter is usually, like the diabetes occurring along with gout, of a mild character.

We may sum up what has been said above with regard to marriage and the married state in the following guiding principles for medical men:

Significance with regard to marriage.—There is no risk attached to marriage as far as the obese husband is concerned, unless we deem it prudent to point out the possibility and significance of sterility resulting from one or other of the

¹*Kisch*, l. c. p. 130.

causes mentioned, and to recommend a suitable method of treatment, where such a course is requisite. The latter is of course also indicated if the obesity and its consequences arise in the course of married life.

In the female sex obesity may render pregnancy dangerous on account of the probability that the disturbances created in the circulatory and the respiratory organs may attain serious proportions. This consideration will however hardly arise in the case of young women about to become married, since obesity rarely is present in other but older females. Where such a thing does happen and an obese young girl or widow contemplates marriage, the physician must call her attention to the dangers she is incurring and at the same time point out the possibility that her marriage may prove sterile from one or other of the above-mentioned causes.

It is of course understood that the treatment of the obesity can be commenced before or after the marriage, just as can be done with respect to all disturbed conditions arising from it. If the treatment does not succeed, it may become necessary in the event of pregnancy occurring to take into consideration the advisability of arresting it by inducing premature labour in order to obviate danger to life. The principles which were laid down when discussing the matter under Diabetes will guide the medical man in coming to a decision. (See page 275.)

Addition:—*adipositas dolorosa* (*Dercum's disease*).

—This affection which has only recently been described as a separate disease, occurs in two forms: (1) as a general and diffuse obesity like the one just discussed but associated with more or less pain over more or less extensive surfaces, and (2) in the form of multiple and painful lipomata.

The significance of the first form from the standpoint of marriage is on the whole similar to that of ordinary obesity, except that the pain occurring either spontaneously or as the result of pressure may necessitate special consideration of the disturbances likely to ensue in consequence of the sexual act or of the excessively painful character of an eventual labour.

In the second form it is only these last-mentioned difficulties which will at least once make their appearance.

Generally speaking it is only very rarely that medical advice can be sought, by sufferers from this disease in connection with the contraction of marriage, especially as, judging from the scanty material existing on the subject, it is principally women at and after the climacteric age who are subject to it.¹

V. Myxoedema.—Of this not very frequent disease we also distinguish two types:

(1) The infantile form of myxoedema (called also sporadic cretinism). It begins at an early age and leads in the course of time, usually about puberty, to such grave physical deformities and mental disorders that the marriage of an individual affected with it can hardly ever come into consideration. The successful results of thyroid-gland treatment do not make any difference in this respect, seeing that they are only of temporary duration and that the discontinuance of the treatment is rapidly followed by a return of the symptoms.

(2) The myxoedema of adults, far more frequent among women than men, commences generally between the 20th and 50th year. In a few cases an hereditary or familiar predisposition to this disease has been observed. Still more frequently cases of insanity are found to have been present in the family or nearest blood-relations.

The marriage of an individual suffering from myxoedema, whether it be a man or a woman, can naturally form the subject of a medical consultation only at a time when all or almost all the symptoms of the disease have yielded to treatment, and a diagnosis would be impossible without a knowledge of the past history of the candidate for marriage. In such a case, the doctor would be the victim of an intentional or unintentional deception, since, were he to give his consent to the marriage, he would certainly not have done so if in possession of all the facts. For in this form of myxoedema, too, the results of treatment are transitory only, and we cannot as yet say with certainty how often it may be possible to repeat the treatment successfully or whether the symptoms may not return

¹S. P. Strübing, Arch. f. Dermat. u. Syphilis Vol. 59.—Ch. Féré, Revue de Méd. 1901 Nr. 8.—Roberts, Philadelphia Med. J. 1902 Nr. 17.—A. Weiss, Wiener klin. Wochenschr. 1903 Nr. 17.

in spite of the repeated treatment and prove disastrous in some way or other to the married couple.

These symptoms are in addition to the cutaneous changes which have given the disease its name, and besides the deformities due to these changes: marked decrepitude and slowness of motility, feebleness of mind, which can go as far as absolute imbecility, and, in regard to the sexual functions, an inclination to miscarriages. There are also frequently noticed: albuminuria and glycosuria, a combination of exophthalmic goitre and acromegaly, all of them signs of a profound disturbance in the metabolism. They require treatment during as well as before marriage.

It is questionable whether the hereditary predisposition to the disease observed sometimes can be removed by the removal of the disease itself. There is no risk of the transmission of myxœdema from husband to wife or vice-versa.

VI. Acromegaly.—This disease is so rare that for this reason alone, it will only be on exceptional occasions that the medical man will be called upon to deal with it in reference to marriage. Besides, like myxœdema with which it has many points in common, acromegaly gives rise to such deformities and disorders that it is extremely unlikely, at least when the disease can be diagnosed with some certainty, that anyone afflicted with it, whether it be a man or a woman, should entertain the idea of marrying or, if so, expect to be loved in return. From a medical point of view, the marriage of an acromegalic individual must be decidedly opposed, even where the disease is not yet fully developed or where there is only a suspicion that it is present. Because although the disease does occasionally get arrested, and although one or other of the symptoms shows at times an improvement, acromegaly is on the whole a more or less rapidly progressing disease, and one which has so far withstood all treatment.

Of all the symptoms of acromegaly those which have the most serious effect upon the married state are besides the general diminution in the physical and moral capability, in women amenorrhœa and sterility, and in men the extinction of the sexual desire.

There is no fear of the disease being conveyed from one of the married partners to the other.

But on the other hand a direct hereditary transmission, to the offspring of acromegaly as a whole or of an inclination to giant growth in the whole body or single extremities, has repeatedly been observed¹ though not in such numbers as to justify on this account a prevention of conception or the interruption of an eventual pregnancy.

VII. Addison's disease.—This affection which in spite of isolated reports of therapeutic successes must still be looked upon as an incurable disease, forms when fully developed an undeniable contra-indication against marriage. Where not yet fully developed and where the diagnosis cannot be made with certainty it is advisable to recommend a postponement until such time when a decision will be possible, which may be expected to be the case in the course of a few years.

The married state as such is no more influenced by Addison's disease than by any other chronic ailment conducive to decline.

Nothing is known as to the contagiousness of the disease or as to its hereditary transmissibility.

VIII. Scrofula.—Being a disease which both in its origin and in its course is peculiar to childhood up to puberty and slightly beyond it, scrofula as such, that is as an existing condition of ill-health, hardly ever comes into consideration in connection with the subject of marriage or the married state. At the marriageable age it is perhaps certain processes which stand midway between scrofula and tuberculosis, but approaching more the latter, such as lupus and the so-called scrofulous affections of the joints and bones that might demand our attention in this respect. These will be found treated in other chapters of this work in so far as they relate to the subject of marriage. (See Diseases of the Skin, and Diseases of the Organs of Locomotion.)

Apart from these diseases, there are some consequential

¹S. J. Schwoner, Ztschr. f. klin. Med. XXII. 1897 Festschr. S. 202.—E. Bonardi, H. Morgagni 1899 Nr. 9.—Breymann, Deutsche Ztschr. f. Nervenheilk. XVII. 1900.—A. Fränkel, Verhandl. des Vereins f. innere Med. in Berlin, 1901, April.

results of past scrofulæ which might exhibit a certain importance in connection with the subject of marriage, as f. i. scars of the skin, of the mucous membranes or of the lymphatic glands along with possible slight deformities or functional disorders, but they are more likely to constitute æsthetic rather than medical objections and will not as such often come under the notice of the physician.

Relation to tuberculosis.—Of greater importance is the fact that scrofula forms a predisposition to tuberculosis and that in the case of individuals who have had scrofula there is always a fear that they will sooner or later be attacked by tuberculosis, especially of the lungs and larynx. And no less important is the other fact that if not scrofula itself at least the predisposition to it and therefore the predisposition to tuberculosis is transmissible to the offspring and consequently hereditary.

The marriage of an individual who has had or still has scrofula may therefore give ground for hesitation firstly because he or she may develop tuberculosis after marriage, an occurrence likely to prove more or less disastrous, and secondly on account of the possibility that the offspring of such marriage will equally suffer from scrofula and the predisposition to tuberculosis associated with it.

But although these scruples are theoretically justified it is only very seldom that practical conclusions are possible, and unfortunately the medical profession is able to achieve the least good in this direction just where it is mostly needed. It is well known that the most favourable conditions for the development and dissemination of scrofula are created not only by inherited predisposition, but also, and even without such predisposition, by imperfect nourishment, by a deficiency of light, air, warmth and cleanliness, in short by that combination which we are in the habit of calling "bad surrounding circumstances."

It is under such circumstances that the poorer classes of the population live and suffer, and it is here where the medical man could often raise his voice against many a marriage and prevent by words of advice and warning the procreation of scrofulous children. But these very same classes do not as a

rule seek medical advice on such matters and in the exceptional cases where they do, they seldom adopt it for reasons which it does not lie in the power of the doctor to remove.

Among the well-to-do classes, on the other hand, scrofula need not be regarded as an obstacle against marriage, at any rate, not as a serious obstacle. Because, as already mentioned, scrofula has in the first instance run its course by the time marriageable age has been reached. And secondly, because the possible dangers arising from a previous or still existing scrofula may both in the individual affected and in his offspring be counteracted with a certain amount of success where there are the necessary means and will-power.

Where the circumstances are favourable there is consequently no necessity for the medical man to oppose the marriage of a scrofulous individual even where there are still some traces of the disease left; nor will he under similar circumstances have to take any other precautions with respect to the offspring of scrofulous or ex-scrofulous parents than to recommend an avoidance of all injurious influences in the mode of life of the latter and the best possible hygienic surroundings for the mother in the case of pregnancy. As regards the children it is desirable that every endeavour be made that they receive judicious nursing and a bringing-up intended to make them strong and resistant.

IX

Diseases of the Blood in Relation to Marriage

IX

DISEASES OF THE BLOOD IN RELATION TO MARRIAGE

By Professor H. Rosin (Berlin)

General relations between blood-diseases and marriage. Influence of blood-diseases upon marriage.—Among the diseases which may exert a far-reaching and lasting influence upon marriage those of the blood are of especial importance. The reasons for this are manifold. In the first instance, the anomalies of the blood which occur most frequently have a decidedly chronic character, and are included among the constitutional, some of them even among congenital, diseases. Though they are usually non-malignant and *per se* not virulent in their course their injurious effects are often of long duration, not infrequently hard to remove and occasionally altogether unavoidable. Another group, fortunately more rare, equally of long duration is generally fatal in its issue and is reckoned among the severest diseases which we know. There are only a few acute disorders in the constitution of the blood which occur mostly secondarily that are amenable to rapid and successful treatment. We must therefore expect disturbances in the happiness and duties of married life if it is only on account of the long duration and partly also of the severity of these diseases.

But affections of the blood are injurious in their effect upon marriage not only as diseases pure and simple, they have also unfavourable remote influences and particularly upon the sexual organs. If every organic disease reacts more or less injuriously upon the other organs in the body, this is especially the case as regards the blood, seeing that it penetrates into every part of

the organism and that it acts as the intermediary of the metabolic process to a very considerable degree. The sexual organs, especially in the female sex, are naturally also very much dependent on a supply of healthy blood. They share this requirement with the other organs. It is however well-known that there are, besides, certain special relations between the genital organs and the blood, so that in the event of disease of the latter the former may suffer in consequence; this is especially the case with married people and particularly so in married women. We know quite a number of diseases of the genital organs of married women, and many a case of severe pregnancy and labour as well as cases of insufficient lactation which are due to an abnormal condition of the blood.

We have also to take into consideration the unfavourable results which appear in the offspring as a consequence of blood-disease in the parents. Apart from the circumstance that certain affections of the blood are decidedly hereditary, there are a number of other milder but also lasting constitutional diseases of the blood in the parents, which may result in the procreation of a weak and non-resistant progeny, who require extraordinary care and attention and destroy the happiness of married life.

Of no less import is the influence of marriage on the diseases of the blood, though not in those severe affections which have an absolutely unfavourable prognosis. The congenital diseases also are not always subject to any influence on the part of marriage. But it is those by far more frequent slighter anomalies which are chronic and constitutional that often experience through marriage a complete transformation. In the man, the more orderly habits of life, the greater circumspection, the regulation of the sexual intercourse occasions an improvement in, or disappearance of, the disordered blood-formation previously in existence. The same factors co-operate in the woman and in her case it seems further that the gratification of the sexual desire is particularly beneficial in its effect upon the activity of the blood-forming organs, and in relieving former menstruation troubles which caused anomalies of the blood. Pregnancy especially exerts its influence upon existing blood-diseases in a

remarkable manner. The latter very often disappears temporarily or even permanently in consequence of the pregnancy, so that the woman owes to this condition the first enjoyment of perfect health and robustness.

In contrast to these favourable effects of marriage upon the blood there are of course also unfavourable ones. Frequently enough we see blood-diseases arising through and in the course of marriage. This is rarely the case in man; at least we know nothing of diseases of the blood in man which may be due to the married state, unless sexual over-indulgence gives rise in its course to temporary abnormalities in the blood-formation, or in other words to anæmic conditions—a most rare event in married life and one which occurs perhaps only during the honeymoon or shortly afterwards. In the woman it is different. In her case diseases of the genital organs of all kinds, including those based on gonorrhœal infection may produce, especially through hæmorrhage, severe affections of the blood. The same thing applies perhaps even to a greater extent to abnormal pregnancy, labour and child-bed.

The special relations of the individual blood-diseases to marriage.—These reciprocal influences between marriage and blood-diseases do not manifest themselves equally in all the individual forms of the latter, but appear prominently now in one form and now in another. It is therefore necessary to consider these relations specially, and this we shall now proceed to do.

The sub-division of blood-diseases cannot, since we do not as yet know the nature and anatomical basis of many of them, take place from uniform points of view. Sometimes the determining feature is supplied by the condition of the blood and the anatomical behaviour of the blood-forming organs, as well as by the outwardly visible pathological changes, sometimes by the kind of the course of the disease (acute, chronic), sometimes by the etiology (essential, constitutional, secondary, infectious blood-diseases), and we distinguish finally also congenital and acquired affections. In the following remarks we shall retain the usual method of classification, but we shall see that from the point of view which interests us here most, namely

that of the influence of marriage, the different blood-diseases deserve different consideration.

I. Anaemia.—We commence with the anæmias. Under this name we include, as is well-known, a large and hardly uniform group of blood diseases which exhibit certain common anomalies in the blood in differently marked degrees, namely poverty of hæmoglobin, a diminution in the number and size of the red corpuscles, and reduction in the dry residue; there always is, besides, an abnormal paleness of the skin and mucous membranes, in addition to a number of characteristic symptoms in other organs, namely pain and a sense of fatigue in the organs of locomotion, disordered digestion, affections of the sexual organs, headache, etc., disturbances which we designate as functional and which are the result of insufficient nutrition on the part of the diseased blood.

If the same clinical picture is common to all the different forms of anæmia, we cannot draw from this the conclusion that the disease of the blood-forming organs is in every case alike, seeing that we know so very little about it. Anæmias are moreover the result of so many different causes that for this reason alone it seems advisable to distinguish several forms of them. This applies especially to the consideration of their relationship to marriage in connection with which the different causes require different appreciation.

Thus one of the most important and most frequent forms of anæmias in the female sex is *chlorosis*; in spite of its common symptoms it especially deserves to be regarded as a separate disease, and will therefore be treated in a special chapter.

Next to chlorosis we have to mention *essential anæmia* which is partly congenital and partly acquired and which developing into a constitutional disease is often brought as such into the marriage.

Associated with this is that form of anæmia, which is produced by an unsuitable mode of life and deficient nourishment, and which plays an important part in married life.

Very prevalent is further the group of *secondary anæmias* arising in consequence of hæmorrhage or other profuse discharges or after all sorts of organic diseases. These also have

a great influence upon marriage especially when they have passed the acute stage and the cause having disappeared they develop into independent chronic diseases.

All these groups of anæmias just mentioned attack the male sex far more rarely than the female, even though we exclude chlorosis for the present altogether from our survey. First of all, the adult man does not incline to that independent form of anæmia which we call *essential*, or also *constitutional*, and which without presenting the typical picture of chlorosis depends nevertheless on a disturbance in the activity of the blood-forming organs; at the marriageable age this anomaly of the blood disappears in males even if it has persisted up to puberty. This constitutional anæmia which is so rare in men appears the more frequently in women. Many of them who were anæmic from birth or from a very early age marry when suffering from the affection. The reason lies first of all in the great predisposition of the female sex to this disease, and further in the circumstance that the mode of life of women at the age of puberty and shortly before marriage does not generally conduce to improvement. It also happens occasionally that women contract essential anæmias in the course of their married life, while men are probably always free from them. More equally divided between men and women are those anæmias which we attribute to an improper mode of life and insufficient nourishment; but here also the female sex shows decidedly a greater predisposition and at the same time a lesser resistibility against the injurious influences. From the secondary anæmias, finally, which have become chronic, women also suffer in greater numbers than men, since the most frequent causes of these conditions are to be found in abnormal hæmorrhages from the genital organs or in diseases of these organs, while hæmorrhages from other organs occur just as often in women as in men, sometimes even oftener, as f. i. from the stomach.

Injurious effects of anaemia on the married state.

—The injurious effects on the married state produced by the anæmia of one or both of the married partners are often considerable though they do not proceed from diseases dangerous

as such to life. Apart from general physical depression which manifests itself in a constant feeling of lassitude, and of general discomfort as well as in manifold disturbances in the various organs of the body, the physical inability to do justice to the duties connected with the married state is often of considerable prominence. The husband derives not only no joy from his work, but his capability to pursue his vocation successfully is diminished, and even where he does succeed by his work he has no energy left to devote himself to his wife and family in his leisure hours as is the duty of the head of the household. Absence of love and tenderness, absence of active interest in the welfare of wife and family, neglected education of the growing children who are left entirely to strange hands are some of the results of the debility and of the desire for quietude which accompany anæmia.

The same may be said with regard to the more frequently suffering wife, and considering her greater share in the conduct of the household and in the rearing of the children, the effect of her illness on the marriage is even more serious still. But the conditions as regards the wife are, besides, far more unfavourable because the anæmias are often provocative of an abnormal state in the genital organs. They give rise *f. i.* to catarrhal conditions of the mucous membranes, to anomalies in the menstruation, which if they existed before marriage as a consequence of anæmia undergo an aggravation in the course of it. Not infrequently there is a complication in the shape of absence of the conceptive faculty. On the other hand, pregnancy, if it does occur, causes in anæmic women an increase in the symptoms which are still further aggravated considerably by the labour and the hæmorrhage connected with it and by the troubles of child-bed; it is well-known that severe anæmia constitutes occasionally a dangerous complication of labour. We also know that in anæmic women involution after labour takes place imperfectly, that lactation runs an abnormal course and that a number of diseases of the genitals are apt to occur in consequence, which may be the cause of endless trouble and of an unhappy married life.

In addition there is the hereditary transmissibility of the

disease to the offspring. It is fortunately no fixed law that the children of parents, one or both of whom were affected with constitutional anæmia, must inherit the disease, but very many of them are born with abnormal debility which can be successfully combated only by great and additional care.

Influence of marriage on anaemia.—If we now ask ourselves: Vice-versa, what influence has marriage on the production and the course of anæmia? we may give something like the following answer:

It may be said, to begin with, that marriage is very frequently the source of origin of chronic anæmias. This is certainly rarely the case as regards the husband. The essential form, as already mentioned, hardly ever develops in married men, and secondary anæmias after hæmorrhages or diseases of all kinds cannot naturally be ascribed to the married state. Anæmic conditions may possibly be caused in a married man by an unhealthy mode of life. This applies particularly to the poorer classes. In their case marriage means occasionally a material deterioration of the economic position, the beginning of poverty, a change to unfavourable conditions as regards housing accommodation, and nutrition. Nor can it be said that this does not occasionally happen among well-to-do people as well. If there is not exactly a fear of starvation, marriage means at times with them also an abnormally increased demand on the earning capacity of the husband, a disproportionately greater amount of work or professional activity under excitements to which the body does not feel equal. In addition to this, there are frequently troubles in the house either on account of the wife's illness or of that of the children, or lasting and far-reaching mental worries and depressions. Not without injurious influence are also the various excesses in which particularly the better classes are wont to indulge under our present-day social environments, especially those prevailing in large towns: prolonged staying-up in over-filled and ill-ventilated rooms after a day's hard work instead of recuperating sleep, and the consumption of excessive quantities of food and drink. It is just in this respect that marriage among the better classes brings obligations along with it which those who are unmar-

ried can, though not always, escape more easily and which they are, at any rate in their younger years more capable of fulfilling. All these injurious conditions are capable of producing in men chronic anæmias if not other serious diseases.

But of still greater import in the causation of chronic anæmias is marriage to the female sex. Apart from the fact that the points just mentioned naturally apply to married women as well as to married men, perhaps to even a greater extent, important causes of chronic anæmia are to be found in the hæmorrhages from, and the diseases of, the genital organs to which women are particularly subject during the course of their married life, far more so than during their virgin state. Severe loss of blood at the end of pregnancy, in labour, and child-bed, diseases of the uterus and uterine membrane in association with it or as a spontaneous occurrence which are complicated with severe hæmorrhages form the cause of chronically anæmic conditions which have developed from originally acute anæmias. Without hæmorrhage also it is possible after long-continued inflammatory affections of the genital organs which have arisen through labour or through infection and also spontaneously or even through lactation for chronic anæmias to develop in married women.

Finally, women are occasionally subject to the essential form of anæmia (without any known etiology) even though they are already married. It is for these reasons that anæmias are so particularly frequent in married women, and that marriage can in some respects be considered as the direct cause of certain forms of anæmia.

But it also is on the other hand possible for marriage to exercise a beneficial influence upon anæmic conditions. As regards man it is only very rarely that marriage is called upon to act the part of a remedial agent in constitutional anæmia, because as already mentioned such conditions do not altogether often occur in the male sex. Where they do exceptionally occur marriage is likely to prove beneficial if it brings along with it an improvement in the mode of life and in the nutrition. The advantage of a regulated married life and the care and attention of a loving wife appear more fully in the

case of those men who have become anæmic through former irregular habits, through injudicious nourishment, through absence of sleep and excesses of all sorts.

The remedial character of marriage in its effect upon the anæmia is still more apparent in the married woman. We shall return to this point when discussing the subject of chlorosis. It is sufficient here to mention that we frequently notice a complete disappearance in married women of essential anæmias as well as of secondary anæmias proceeding from the genital organs. It would seem that the gratification of the sexual desire alone acts alteratively on the anæmias themselves and on certain of their causes, as f. i. profuse menstruation, dysmenorrhœa, catarrh of the mucous membranes, etc. But it is pregnancy which is very often the most pronounced beneficial remedy. Though an abnormal pregnancy and a difficult labour are capable of producing anæmia, a normal pregnancy is on the other hand often beneficial in its effect upon former diseases of the genital organs and former deficient blood-formation.

Should anæmic individuals marry?—The last-mentioned favourable influence of marriage brings up the question whether individuals with fully developed anæmia should be permitted to marry.

As regards chlorosis which is probably the form of anæmia that occurs oftenest in unmarried women the reader is again referred to the special chapter dealing with it.

As regards the other forms of anæmia the following remarks seem to be indicated:

Consideration of the causal region in secondary anæmias.—It is of importance to ascertain which form of anæmia is present. For in secondary anæmias it is necessary to consider carefully whether the causal complaint is not such as to be prejudicial or inimical to marriage. Very often there is hidden behind an anæmia which resists all treatment an insidious tuberculosis, which has as yet produced no manifest pulmonary or other symptoms. Chronic nephritis with intervals free from albuminuria, may also be simulated by anæmia where the examination is not very carefully conducted. This applies also to chronic pyrexial conditions, slowly progressing suppuration,

typical malaria, parasitic infection of the intestines, gastric and duodenal ulcers, hereditary syphilis, severe diseases of the genital organs, and malignant tumours at the beginning of their development. All these diseases must be excluded with certainty before it is possible for the medical man to give his consent to the marriage of an anæmic individual.

Of less serious import but nevertheless demanding careful examination are anæmias after continuous loss of blood which have become chronic. Where the cause lies in some innocent ailment such as frequent epistaxis, bleeding hæmorrhoids, menorrhagia without any serious disease of the genital organs there is no need to refuse permission to marry. But in any case the necessary treatment for the removal of the causal disease must be instituted as soon as possible before marriage. Against profuse menstruation it will, however, not always be possible to interfere successfully and we shall have to bear in mind the fact mentioned above that the causes of this anomaly are frequently improved by marriage or removed altogether. The practitioner will therefore let himself be guided by the same circumstances as in chlorosis (which see).

Anæmic conditions which are the consequence of an unhealthy mode of life and of excesses of all kinds are, as has already been said cured during and by marriage under certain circumstances. Marriage may therefore be recommended in such cases, but of course only if an improvement in the method of living and a change for the better is thereby to be expected.

Essential anaemias are with certain restrictions no obstacle against marriage.—Essential or constitutional anæmias proper if not abnormally severe in character are similarly no obstacle against marriage seeing how often a cure is actually accomplished by marriage. And what is no less noteworthy, we often come across married people otherwise healthy but anæmic who are by no means so incapable to fulfil their obligations as one would expect from their outward appearance. Delicate from childhood and accustomed to great cautiousness in their entire mode of life, endowed with a good faculty to estimate their physical strength, they are more careful in the hygiene and dietetics of their married life than many

others who though in full vigour are apt to forget themselves. They know instinctively how to utilise fully to the benefit of their health the advantages offered by the married state, and how to avoid excesses. Every experienced doctor knows such individuals who are affected with constitutional anæmia and are for this reason regarded by laymen as delicate, but who nevertheless manage to steer through their married life happily, to escape serious diseases, to become with advancing age more and more resistant and to live longer even under circumstances of a somewhat unfavourable character than many with robust constitutions. Such individuals may therefore be permitted to marry, even where there is no certainty that the essential anæmia will be cured, especially if, as it often happens the contracting parties are of equal constitution. Opposition to such marriage on the part of the medical man is however justified where the constitutions of future husband and wife are too widely different from one another. For where the one is suffering from constitutional anæmia, and the other is in full possession of health and vigour, the contrast in the two constitutions and in the physical and psychical inclinations associated with them may easily cause disagreements in the course of the married life which will affect not only the moral happiness of both partners but also subject the anæmic husband or wife to bodily influences not in consonance with the former cautiousness and careful mode of life. The medical man's duty is to prevent such conditions and to use his warning advice to the best of his ability.

One of the ill-results of essential anæmia from the standpoint of marriage which has already been mentioned, namely the injurious effect upon the offspring, though not to be underrated will hardly receive much practical consideration at the arrangement of marriages. For in the first place an hereditary predisposition, especially if derived from one side only does not fortunately always manifest itself. But where as it often happens both father and mother are delicate they do occasionally—not always—bring into the world children of a more or less degenerate character and of such a constitution as was considered by the Spartans a sufficient ground for letting them

perish as being unfitted to undertake the obligations of life. Because congenital debility often kills them in the first few months of their lives: rickets and scrofula contribute their share in producing a feeble non-resistant generation which if mentally well enough developed is at least bodily much deteriorated. And though the parents belong to that class of individuals who, as already mentioned exhibit in spite of their anæmia a certain resistibility against the injurious influences of life this quality is often lost in those descendants who possess a double hereditary predisposition. Nevertheless it is impossible for the medical man to prohibit a marriage on account of such hereditary transmissibility. His duty lies rather in the direction of recommending all possible endeavours to counteract the hereditary predisposition of the children by increased attention and greater care and the adoption of precautions from the very earliest moment, such as judicious nourishment, hygienic measures and physical exercise at the proper age, which will tend to transform the inherited weak constitution into a healthy and strong one. Unfortunately this is a consummation which can hardly be expected in the case of the poorer classes and death will continue to claim his numerous victims from among the children of poor anæmic parents.

The medical man will have to devote special attention to the possible influence of pregnancy on anæmic women. As already mentioned it cannot be said with certainty at the beginning of a marriage whether that influence will be beneficial or injurious. Where the latter has been the case or where pregnancy and labour are directly responsible for a state of anæmia it is necessary in extreme cases to insist on sexual continency as long as the disease remains active in order to avoid danger by further loss of blood and exhaustion.

II. Chlorosis.—We will now consider that special form of essential anæmia which we call *chlorosis*. Its close connection with the other anæmias is evidenced by the symptomatology which is in many respects alike and by the circumstance that it is benefited by the same therapeutic measures. Nevertheless chlorosis may be separated from the other anæmias as a special disease peculiar to young females, the more so as most authors

agree in ascribing to it a special relation to the genital organs. It is questionable whether it ever appears at all in the male sex. In any event, cases described as chlorosis appear in male adults only at the age of puberty, that is, at a time of life when marriage is with them as yet altogether out of the question. For this reason we have to consider the female sex exclusively when treating of the influence of chlorosis on marriage and vice-versa. The disease is often present in young women at an age which precedes immediately the entrance into the married state.

Though this is not exactly the place to go into a detailed description of the symptoms of chlorosis which as already said are not dissimilar to those of anæmias in general, it is advisable in view of our present subject to touch briefly upon the relations which the disease has to the sexual apparatus. That such relations do exist is highly probable, but objectively they are not by any means very pronounced. There is no doubt that a portion of the anomalies which the genital organs of chlorotic women exhibit is the result of nothing else but deficient nourishment on the part of the diseased blood. Among these are included as in other anæmias, disturbances of menstruation, catarrhal affections of the mucous membranes and pain in the respective organs. More significant than these disturbances in the genital organs for the assumption that there is a connection between chlorosis and the sexual function are certain subjective sensations. The principal of these is a remarkable alteration in the wishes and inclinations as well as in the psychical attitude which chlorotic women manifest occasionally almost as markedly as women in a state of pregnancy. Apathy, general depression or a striking alteration in the temperament, often become quite marked features altogether independent of the bodily condition. In addition, there is that peculiar abnormal desire for certain articles of food which chlorotic women share with those who are pregnant. Frequently there is nausea in the morning especially at the menstruation periods. Finally, the commencement of the disease is as a rule accompanied by a diminution in the sensual inclinations—there are also exceptions in an opposite sense—; the psychical depression extends also to the sexual sphere.

Should chlorotic women marry?—Since chlorosis generally begins about the time of sexual maturity and lasts for many years, resisting all treatment, chlorotic patients or their parents may often find themselves confronted with the question whether marriage is in their case permissible or desirable. The medical man also has often occasion to ask himself whether girls suffering from chlorosis may marry without injury to their own health, without detriment to the eventual offspring, and without disadvantage to their married life. We may perhaps answer this question in the following manner: Where the female concerned is still very young, every possible attempt must be made to cure the disease before marriage is entered into. Experience shows, that the majority of cases of chlorosis are cured before the age of 20, especially if the proper treatment is instituted. It is not however always possible to wait till a cure has been accomplished; a somewhat advanced age, the prospect of a happy marriage, an existing engagement, and other circumstances render sometimes a quick decision necessary. We must therefore rely to a great extent upon what we know from experience, namely that very often, perhaps as a rule, chlorosis disappears completely in young married women soon after their marriage and especially with the beginning of pregnancy. The above mentioned relations of chlorosis to the genital function receive in this way further confirmation through the favourable results achieved by a regulated married life. The doctor may therefore not only give his consent to the marriage of a chlorotic young woman where suitable treatment has been either impossible or unsuccessful, but he may under certain circumstances actually recommend it.

We may thus say that speaking from experience chlorosis has as a rule no injurious effect upon the development of marriage, and what deserves to be specially mentioned, nor upon that of the offspring. On the contrary, marriage is frequently an excellent remedy for the disease, though not always applicable.

It must not however be forgotten that there are now and then cases of chlorosis which are not benefited by marriage, though it must remain an open question whether the diagnosis

chlorosis is in such cases justified, and whether there are any *chlorotic* married women at all. The probability is that these cases do not belong to the domain of chlorosis, but to that of constitutional anæmia. However it may be, we shall under such unfavorable circumstances expect to see the same injurious effects arising in the married life in consequence of the disease both as regards the welfare of the wife as well as the happiness of the family and the health of the children, as we had occasion to mention above when discussing the anæmias generally.

Of acquired blood-diseases it is principally the anæmias which we have so far dealt with rather minutely, that are of importance as regards their relations to marriage. The question is not so important in connection with other acquired diseases and these will therefore receive the following brief consideration only.

III. Hæmoglobinaemia.—In the first place we will mention hæmoglobinaemia (*hæmoglobinuria*), and namely that idiopathic form which appears mostly after a cold, and which in contrast to the symptomatic form produced by toxic agencies (and also by syphilis) generally runs a mild course and disappears without leaving any injurious influences, as soon as the cause is removed. It is not necessary to prohibit the marriage of patients who suffer from this hæmoglobinaemia, which is also called *paroxysmal hæmoglobinuria*, as the disease can have no significance as regards marriage, the more so as it never re-appears so long as the injurious influences are avoided. It is only those cases that become complicated by chronic nephritis which acquire a serious importance from the standpoint of married life.

IV. The hæmorrhagic diathesis.—The same may be said with regard to the group of blood-diseases which are included under the name of *hæmorrhagic diathesis*, affections manifested by hæmorrhages through the skin and mucous membranes without a diminution in the coagulability of the blood. They are diseases which run quite different careers and which while having the tendency to hæmorrhages as a common symptom vary with respect to other important signs. Simple purpura, which consists exclusively of cutaneous hæmorrhages

is a mild, generally apyrexial, complaint which often accompanies rheumatic affections; where the latter predominate the disease which resembles greatly in this respect certain skin diseases is called by the well-known name *peliosis rheumatica*. The purpura hæmorrhagica (*morbus maculosus Werlhofii* [Werlhof's purpura]) the pleonastic name of which is probably meant to convey an idea of the seriousness of the hæmorrhages, is sometimes a harmless apyrexial ailment, and sometimes a feverish probably infectious or toxic disease of most serious prognosis. It is not likely that both forms spring from the same cause. As to *scurvy* (*scorbutus*) it is due to faulty nutrition, namely prolonged deprivation of fresh meat and vegetable juices. It is characterised by hæmorrhages from the gums which are especially prominent in addition to hæmorrhages from the skin and also from other mucous membranes.

All these so-called hæmorrhagic diatheses may acquire special significance in the married state during pregnancy only, and in labour particularly, since most dangerous hæmorrhages have been observed in the latter.¹ This applies, of course, only to the severer forms which are designated as *morbus maculosus*. Scurvy is exceedingly rare in Germany and hardly ever affects the female sex.

As regards pregnancy, to begin with, *Fellner*² has established that of 7 cases which he found in the literature of the subject, 3 ended fatally. The embryo also suffers through the disease in the mother. Miscarriages occur in consequence of endometritis hæmorrhagica or of placental hæmorrhages.

The labour process itself is naturally highly dangerous and all the necessary precautions must be taken in time to avoid death from hæmorrhage. Postpartum hæmorrhage during child-bed can also frequently cause serious danger and requires careful attention.

¹*Weise*, Ueber uterine Blutung bei morbus maculosus. Inaug.-Diss. Brl. 1884.—*Wiener*, Ueber hæmorrhagische Erkrankungen bei Schwangeren u. Wöchnerinnen. Arch. f. Gynæk. 1887, Vol. 31.—*Stumpf*, Ueber hæmorrh. Erkrank. im. Wochenbett. Arch. f. Gynæk. 1888, Vol. 39.—*Phillips*, Influence of Purp. hæm. on menstruation and pregnancy. Gynecological Society. London 1891.

²*Fellner*, Die Beziehungen innerer Krankh. etc. Leipsic and Vienna 1903.

Diehl has demonstrated the possibility of the hæmorrhagic diathesis being conveyed to the child. The disease though not constitutional is therefore occasionally hereditary.

But though this hereditary character of the disease cannot be of any great importance as regards the contraction of marriages, pregnancy in the course of it must be regarded as a very undesirable complication which ought to be avoided if possible; indeed, where the hæmorrhage from the skin and mucous membranes is severe and the consequent anæmia great and progressive the artificial interruption of the pregnancy is indicated though it must be admitted that this procedure cannot be instituted without running the risk of death from hæmorrhage.

V. Haemophilia.—We come now to the consideration of a congenital disease of the blood which is along with the anæmias of the utmost importance with regard to marriage. It has been studied carefully for the first time at the end of the 18th century (*Fordyce, Rave*) and is called since *Schönlein* named it so, *hæmophilia*.

Nature of the disease.—The nature of the disease is not yet sufficiently known and it is possible that it depends on an insufficient coagulability of the blood (*Grandidier, Lossen, Alex. Schmidt*), that is, an anomaly in that fermentation process which comes into action immediately the blood leaves the blood-vessels or as soon as a considerable disturbance of the circulation takes place within the latter, particularly through some alteration in their walls. It is as yet questionable whether absence or insufficiency of fibrin-ferment constitutes the cause of the disease; possibly the lime-salts necessary for coagulation are not present in sufficient quantity. The researches in that direction have however hitherto proved fruitless. The blood of hæmophilics behaves somewhat like blood when it has been altered by the addition of leech-blood which acts towards coagulation as an anti-fermentative. Some authors think the disease is also due to an alteration in the blood-vessel-walls (fatty degeneration of the intima of the capillaries, according to *Kidd* and *Birch-Hirschfeld*), others attribute it to abnormal narrowness of the vascular system and want of proportion between its

calibre and the quantity of blood (*Virchow, Zimmermann, Oertel*). *Koch* believes in infection without adducing any proofs in support of his opinion.

General dangers.—It is well known that hæmophilics are on account of the diminished coagulability of the blood in constant danger, the more so as with the exception perhaps of old age, the condition persists throughout life and seldom undergoes an improvement. Slight injuries accompanied by hæmorrhage especially in such parts of the body which are difficult of access for purposes of arresting the bleeding, that is, internal organs, and diseases of the latter which also may lead to hæmorrhage, as f. i. gastric and intestinal ulcers, hæmorrhagic inflammations of the kidneys and bladder, diseases of the genital organs accompanied by hæmorrhages, may at any time bring the hæmophilic within an ace of bleeding to death.

Dangers during married life.—There is consequently not the least doubt that marriage constitutes in the case of hæmophilics under all circumstances a serious danger. When the husband suffers from the disease, the worry and anxiety lest something serious should happen in connection with the slightest accident are a constant source of trouble. More than ordinary care will have to be exercised in order to avoid as far as possible injuries or diseases which result in hæmorrhage, particularly affections of the digestive tract, and thus save the family from the possible loss of the bread-winner.

Hæmophilia is however of totally different significance when the wife is the affected party. In her case hæmorrhages from the genital organs (even during coitus) particularly in labour and in child-bed, are of extraordinary danger. Strange to say, normal menstruation proceeds in hæmophilic women as a rule without causing any serious troubles. But, on the other hand, abnormal conditions, especially metrorrhagias generally take a far more unfavourable course. The danger reaches its highest point at the labour-act; death from hæmorrhage occurs in parturient hæmophilic women exceedingly often.

Distribution of hæmophilia.—Fortunately experience teaches us that women suffer from hæmophilia far more rarely than men. Thus *Grandidier* observed in 200 hæmophilic fami-

lies only 48 females out of 657 bleeders. *Stahel* found in 4 generations only male hæmophilics.

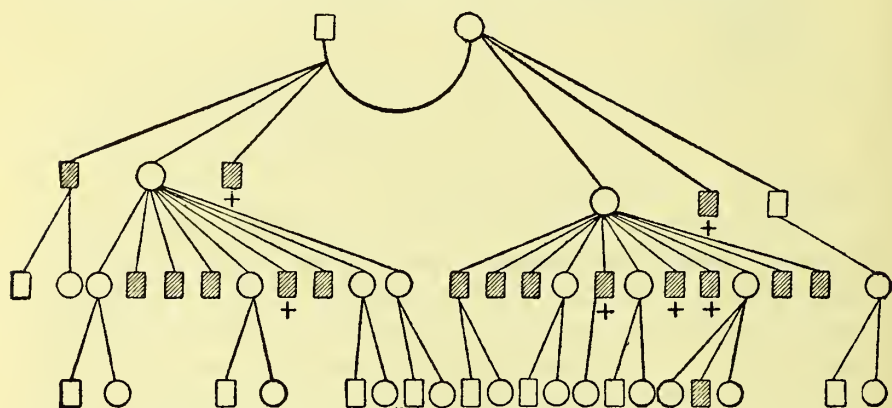
The geographical distribution of the disease is according to *Grandidier* as follows:

	Hæmophilic families	Number of bleeders	M.	F.
Germany	93	258	236	22
England	46	141	134	7
France	20	80	75	5
North America	15	61	60	1
Russia	7	11	7	4
Switzerland	5	48	48	—
Sweden and Norway	3	9	6	3
Holland	2	9	7	2
Belgium	1	4	4	—
Denmark	1	3	2	1
East Indies	1	6	5	1
	194	630	584	46

Germany presents therefore the greatest number even in proportion to the whole population.

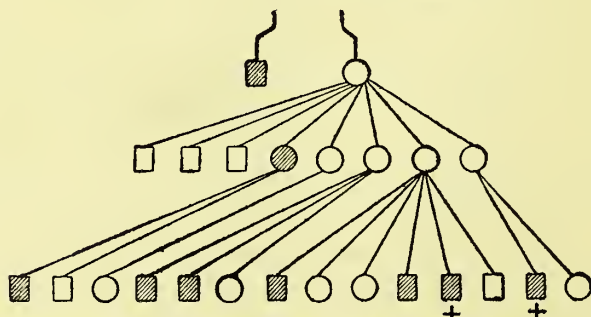
Of the greatest importance however for the marriage of hæmophilics is the hereditary transmissibility of the disease to the offspring. The hereditary conditions of the affection are strikingly similar almost in every detail to those of colour-blindness (*Horner*, and others) and hemeralopia (*Ammann*). It is said moreover that hæmophilic families have very numerous descendants. (*Wachsmut*.) Of course not all the children are attacked by the disease, and *Grandidier* has in this respect demonstrated a certain mode of heredity. Men who come from hæmophilic families procreate with healthy women who do not spring from hæmophilic families as a rule healthy children though they are themselves bleeders. Women who are descended from hæmophilic families procreate on the other hand with healthy men almost always a few hæmophilic children, even though they are not themselves bleeders. It is therefore the females who are responsible for the heredity of the disease; it is they who are the *conductors*. Their capability to transmit hæmophilia extends as a rule to their male descendants. *Grandidier* and *Vieli*, and after them *Hösli*, have examined carefully into the family histories and the hereditary character of the disease in the well-known bleeder-village Tenna in the canton Graubünden and have arrived at the following conclu-

sion: Hæmophilia is oftenest transmitted hereditarily from the hæmophilic father through the non-hæmophilic daughter to the male grandchildren, and similarly from the non-hæmophilic or hæmophilic mother through the non-hæmophilic daughter to the male grandchildren; rarest, directly from father to son. Another family of bleeders that has become known besides those in the village of Tenna is the family of Mampel from Kirchheim near Heidelberg, described by *Chelius* in 1827, by *Untzenbrecher* in 1841 and recently by *Lossen*. Appended are a few charts of the disease in hæmophilic families:



Genealogical tree of the family Mampel, after *Lossen*.

- = Bleeder
- = Female
- = Male
- ⊕ = Bled to death.



Genealogical tree of the hæmophilic family described by *Gocht*.

May hæmophilics marry?—The question whether hæmophilics may marry acquires under such conditions a special interest. Since heredity plays such an important part, and the female members particularly are regarded as conductors of the disease, it is the duty of the physician according to *Grandidier* to oppose marriage under certain circumstances. We may accordingly lay down the following formulæ:

1. Female members of hæmophilic families should not marry even if, as is generally the case, they are not themselves bleeders.

2. Male members who are not themselves bleeders may marry without running any risks.

3. Male bleeders should not, on account of the hereditary character of hæmophilia, be dissuaded from marrying women belonging to non-hæmophilic families unless it is proved that in their families hæmophilic men also have produced hæmophilic children.

The doctor cannot expect to see his advice always acted upon. It is true that in the village of Tenna the female members of the hæmophilic families have vowed among themselves never to marry, but such a decision even if carried out cannot hope to find many imitators. As already mentioned, the families of bleeders are as a rule very large and the number of daughters requiring parental support would be too great and burdensome were they in all cases to remain unmarried.

It is worth while to mention briefly that as age advances hæmophilia diminishes in severity and that those who attain old age lose the disease almost entirely. Finally, we must bear in mind that hæmophilia occurs occasionally as a constitutional disease, either congenitally (case of *Wendt*) or acquired in individuals not hereditarily predisposed to it; the 22d year is in the latter case regarded as the extreme age for the commencement of the affection. Such individuals may form the starting-point of hæmophilic families.¹

¹From the more recent literature on hæmophilia, the following deserve especial mention:

1. *Kehrer*, Archiv f. Gynäk. 1871.

2. *Lossen*, Deutsche Zeitschr. f. Chirurgie 1876.

VI. Severe diseases of the blood.—As a last group we have left for consideration the diseases of the blood which are included among the most serious diseases we know, and all of which almost without an exception, are fatal. Among them we reckon leukæmia, primary pernicious anæmia (*Birmer*), pseudoleukæmia, and splenic anæmia. (*Banti's* disease cannot be regarded as a disease of the blood proper notwithstanding the severe affection of the blood-forming apparatus, especially that of the spleen.)

We need devote but little space to the consideration of these fatal diseases of the blood. Patients suffering from one of them will hardly ever entertain the idea of marrying, and the medical man also will, of course, have no hesitation in declaring himself against it under any circumstances. Where one of these dangerous maladies occurs in the course of married life, it acts as a catastrophe which soon brings the married state to an inevitable dissolution. And so there is really nothing more to be said of these diseases in their relation to married life.

Influence of pregnancy on, and hereditary character of, the diseases.—A few words on the influence of pregnancy on the course of these diseases and on the possibility of their hereditary transmissibility are nevertheless not out of place.

As regards leukæmia, to begin with, pregnancy is extremely unlikely to occur in the course of it. *Fellner*¹ was able to establish with certainty that only in 3 out of 14 cases known in literature the disease had existed before conception. It is therefore possible that the predisposition to leukæmia is increased

3. *Forster*, Gerhardts Handbuch der Kinderkrankheiten 1878.

4. *Kidd*, Med.-chirurg. Transact. 1878.

5. *Hösl*, Inaug.-Diss. Basel 1885.

6. *Wendt*, New-York Med. Record. 1887.

7. *Fischer*, Inaug.-Dissert. München 1880.

8. *Koch*, Die Bluterkrankheiten. Stuttgart 1889.

9. *G. Cohen*, Zeitschr. f. klin. Med. 1890.

10. *Wehle*, Ueber Haemophilie bei d. Geburtsakt. Ges. f. Gyn. Dresden 1893

11. *Litten*, Penzoldt-Stinzing, Handb. f. Therapie.

12. *Gocht*, Archiv f. klin. Chirurgie, Vol. 59, 1899.

¹*Fellner*, Die Beziehungen innerer Krkhn. etc. Leipzig und Wien 1903.

by pregnancy, an opinion which *Sänger*¹ does not share. In any case pregnancy exercises a very injurious influence upon the course of the disease. Rapid growth of the spleen and an exceedingly high increase in the number of the leucocytes have been observed in connection with it. In one case reported by *Stillmann* the proportion was as high as 1 in 3.

And yet the conceptive faculty is not prejudiced by leukæmia. *Cameron*² has seen repeated pregnancies during the progress of the disease. Labour occasions sometimes rapid aggravation and leads to coma and death.³ The predisposition may be hereditarily transmitted to the children. In *Cameron's* case all the children had a tendency to leukæmia and one of them died from it in 5 months. Besides, most pregnancies in the course of leukæmia end fatally a few hours or days after the premature expulsion of the embryo. Only 4 cases are known which did not terminate with death. *Sänger* thinks that the induction of premature labour should be postponed until the child is perfectly viable; he recommends artificial abortion only in extreme cases. As a matter of fact *Fellner* reports that 3 artificial abortions saved the respective 3 women. Opinions like those of *Sänger* have been expressed by *H. Schröder*.⁴ The severity of the symptoms must be the guide for the treatment to be adopted in order to prolong the life of a leukæmic woman.⁵

What has been said above applies also to the other fatal diseases of the blood, that is, primary pernicious anæmia, splenic anæmia, and pseudoleukæmia.⁶ In their case, too, pregnancy

¹*Sänger*, Über Leukaemie bei Schwangeren und angeborene. Leukaemie. Arch. f. Gynäkol. 1888. Vol. 33.

²*Cameron*, Influence of leukaemia on pregnancy. Internat. Med. Congress of Washington. Sept. 1887, and American Journal of Sciences 1890.

³*Green*, Acute Leukæmia during pregnancy. New-York Med. Journ. 1888.

⁴*Schröder*, Über wiederholte Schwangerschaft bei lienaler Leukaemie. Arch. f. Gynäk. Bd. 57.

⁵*Jaggard*, Leukæmia and pregnancy. Med. News July 1890.—*Hilbert*, Ein Fall mit Schwangerschaft komplizierter acuter Leukæmie. D. Med. Wochenschr. 1893 Nr. 36.

⁶*v. Jaworsky*, Über die schwere Anaemie Schwangerer. Centralbl. f. Gyn. 1897.—*Saniter*, Hochgradige Anaemie in der Schwangersch. Centralbl. f. Gyn. 1899 Vol. 19.—*Commandeur*, Un cas d'anémie pernicieuse puerpérale etc. Progr. Méd. Lyon 1900.

constitutes a most dangerous complication, and cases of these diseases are known where the illness commenced subsequent to the beginning of the pregnancy. (*Fellner.*) Labour is almost always fatal, while prior to it, that is, during pregnancy, the clinical picture is not much more serious than in the absence of pregnancy; on account of the hopelessness of the cases and the danger of labour all that is perhaps justifiable in the interest of the child is to induce premature labour.

X

Diseases of the Vascular System in Relation to Marriage

X

DISEASES OF THE VASCULAR SYSTEM IN RELATION TO MARRIAGE

By **Professor E. v. Leyden** (Berlin) and
W. Wolff, M.D. (Berlin)

Married individuals attain an average age of 60 years, those unmarried an average of 45 years. This we see from statistics. According to *Darwin* the lower mortality of the married class as compared to the unmarried class depends mainly upon the exclusion of imperfect types; it is therefore a result of natural selection. Perfect individuals marry in greater numbers than imperfect ones. Besides, it may be assumed that the greater regularity of the mode of living resulting from the married state exercises a beneficial influence also upon the duration of life of both husband and wife. Marriage is from the hygienic standpoint as well as from the æsthetic and social points of view a desirable object for every normal adult individual. It must however be remembered that marriage brings along with it certain responsibilities, the fulfilment of which requires perfect health of body and mind.

The subject "Diseases of the vascular system in relation to marriage" imposes upon us the duty to elucidate from the medical point of view: firstly, in which cases conditions exist before marriage which would constitute the latter a more or less pronounced danger to the health of the husband or the wife, in other words, when the physician's duty is to warn against marriage; secondly, we have to answer the question, what should the attitude of the medical man be where under analogous predisposing circumstances either the husband or the wife is attacked by disease. In order to be able to answer these two

questions we must ascertain first the nature of the injuries which may result from marriage as such. Thirdly and finally, it is of the utmost importance to establish how far the disease of one of the married partners may influence the health of the children born from such marriages; that is to say, how far diseases of the vascular system are hereditary.

The principal thing with regard to the diseases in question is the reaction of marriage on the patient. As far as the wife is concerned, the danger lies in the majority of cases in pregnancy, more rarely in the sexual intercourse as far as the husband is concerned, in the latter only.

The worries about the children and about their education, the nursing which they require in health and in disease, are not quite avoidable in any family. They are however as a rule richly compensated for by the joy that the marriage has not remained sterile.

In considering the reciprocal relations between marriage and various diseases, it is necessary to study the different injuries which marriage may occasionally produce in each case individually, seeing that they are not typical. Financial troubles, *f. i.* do not only injure both sides, but they affect the diseased husband or wife more than the healthy one. Psychical disturbances happen no doubt to every married couple; the happier the marriage, the more rare and less effective they are.

Occupation and social position of husband and wife.—The occupation and social position of the husband particularly, as the head and bread-winner of the family, must receive the special attention of the physician. A wife suffering from heart-disease, is according to the pecuniary position of her husband able to take care of herself or obliged to assist him in the earning of the livelihood. A working-woman who marries makes a change for the better, provided her husband earns sufficient to maintain her and her family. But she does not improve her position by the act of marriage as such. The change is however for the worse, where she has to contribute by her own work to the maintenance of the family.

In the first instance her health will benefit by the marriage,

in the second it will suffer. Where marriage occasions an improvement in the material circumstances, the injuries caused by the married state may partly be counteracted.

Prudent marriages in the sense of Darwin.—

Where a contemplated marriage is prompted not by inclination, but by other motives—and of such there are very many—the physician's task in advising against it is a far lighter one than where he has to oppose the union of two individuals who love each other truly. We know from experience that in the latter case the doctor preaches as a rule to deaf ears, and that in the majority of cases his advice is not followed.

For the sake of the health of the offspring, it should be a general law that the parents shall be free from the predisposition to those diseases which are proved to be hereditary and which in fact are frequently inherited. According to the social position of the married couple, this standpoint is of more or less importance. At the arrangement of marriages of crowned heads for instance, the question of the state of health of the chosen wife or husband receives the most careful consideration. But in the case of ordinary mortals also, the point should never be neglected.

Whoever intends to contract a prudent marriage in the sense of Darwin, will himself select a healthy partner coming from a healthy stock.

In passing now to the special consideration of the diseases of the vascular system, it is clear that generally speaking our principal duty is to answer two questions: 1st, how far is heredity concerned in the diseases under notice; 2nd, how does marriage affect the patients themselves? The points of view resulting from the answers to these questions govern our medical action.

We divide our subject into:

I. *The significance of diseases of the heart with reference to the married state.*

II. *The significance of diseases of the arteries with reference to the married state.*

III. *The significance of diseases of the veins with reference to the married state.*

IV. *The significance of diseases of the lymphatics with reference to the married state.*

We begin with the most important section.

I. Diseases of the heart.—It is an incontrovertible fact that there are families in which diseases of the heart occur particularly often. Nothing is therefore more likely from a superficial consideration than the assumption that diseases of the heart are to be regarded as hereditary. And as a matter of fact this heredity is looked upon as a reality by both the educated and uneducated public. From a medical point of view, however, which limits strictly the conception of heredity we arrive at quite a different conclusion. Most affections of the heart are not as such hereditary, but acquired. Their frequent occurrence in certain families can be accounted for by other reasons. Not the diseases themselves are inherited, but the predispositions which may lead to diseases of the heart, and these predispositions we will shortly discuss in detail. Hereditary in a true sense are only a small number of congenital affections of the heart, and namely only those the origin of which we suppose to be due to congenital malformations. We will therefore consider first the congenital diseases of the heart.

I. *Congenital diseases of the heart.*

Consent to marriage in cases of congenital disease of the heart.—The question of heredity interests us here in an entirely special sense. We have to ask ourselves: Is it our duty in the case of a man or woman affected with a congenital disease of the heart to dissuade from marriage, on account of the possibility that such marriage may result in the production of children also affected with heart disease? Or, shall we, where either one or the other side of a married couple has a congenital affection of the heart, recommend the avoidance of pregnancies? Such a course of action on the part of the medical man is most assuredly not justified. True, that heredity is in occasional observations strikingly manifest (*Vierordt*),¹

¹*Vierordt*, Die angeb. Herzkrank. Nothnagel's Spec. Path. u. Ther.

but on the other hand other causes are just as frequently given, f. i. syphilis of the parents, consanguinity and tuberculosis. It is a well-known fact that the inclination to malformations is hereditary. But we have as medical men no right, for instance, to prohibit the marriage of a man who has hare-lip, because there is a risk that he may eventually bring children into the world affected with malformations, perhaps in some other part of the body. Besides, there is the important circumstance to be remembered, that in diagnosing at a later period of life congenital disease of the heart we are not always in a position to decide whether the affection rests on malformation or arrest of development, or on fœtal endocarditis or on both these factors. With respect to heredity, infectious fœtal endocarditis is of course of no consequence.

But even if, judging from what has been said above, we were justified in declaring our opposition against such marriages, we should only in very rare cases have practical opportunities of doing so, since no more than an insignificant number of individuals with congenital heart-disease attain marriageable age. On the other hand, we are often confronted with the second of the two questions, namely: is there any danger in marriage for people with congenital heart-disease?

Let us now consider somewhat more closely each of the congenital affections of the heart.

Almost half the number of the published cases of congenital affections of the heart relate to pulmonary stenosis. (*de la Camp.*)¹

Further, *Peacock* has established that of the individuals with congenital heart-disease who become more than 12 years old, more than $\frac{4}{6}$ are affected with stenosis or atresia of the pulmonary artery. But the patients who live more than 12 years also have, apart from a few exceptions, only a limited duration of life. *Vierordt* calculates the average duration of life in pulmonary stenosis at 9.36 years. Patients with pulmonary stenosis who have withstood well their early childhood generally succumb to tuberculosis; in some of them disturbances of com-

¹*de la Camp.* Congenit. Herzleiden in "Deutsche Klinik."

pensation appear at a time when life begins to make great demands upon body and mind, that is, when people are grown up. To these increased demands the diseased heart is not equal. Supposing, however, that we have before us a patient with pulmonary stenosis, we shall naturally be guided in the presence of this valvular disease by the same principles which apply in the case of acquired valvular diseases, and which we shall discuss later on.

There remains but very little yet to be said with regard to the other congenital affections.

The congenital disease next in frequency is according to *de la Camp* the stenosis of the aorta at the entrance of the ductus arteriosus, which has a fairly favourable prognosis. Favourable, and when not complicated, as a rule undiagnosable is the patency of the foramen ovale. Finally, the prognosis is also favourable in those cases where the ductus arteriosus remains open. More than half the number of patients exceed the age of puberty. Observations have also been published of severe forceps-labours and consequently of pregnancies which were well born. (*de la Camp*.) The other congenital diseases of the heart offer an absolutely unfavourable prognosis as regards life and do not therefore come within the sphere of our considerations.

Congenital stenosis of the aorta.—In considering the congenital defects of the heart we must not forget to mention finally an important anomaly, namely the congenital narrowness of the aortic system. According to *Vierordt*, those individuals in whom this narrowness of the aortic system attains serious proportions succumb as a rule in early manhood from weakness of the heart, because the latter is not equal to the normal task life imposes upon it. *Vierordt* himself points out that with greater care a more advanced age would probably often be reached. For this it would above all be necessary to watch the symptoms which such an hypoplasia of the aortic system produces. Now, the main symptom is chlorosis, the close connection of which with the disease we are now considering was first demonstrated by *Virchow*. Although according to him the question of the congenital stenosis of the aorta is not

a purely gynæcological one, that is, although the abnormality occurs in men as well as in women, chlorosis is nevertheless pre-eminently a disease of the female sex. The most favoured age is the time of puberty and the years subsequent to it.

The very fact that chlorosis is in many cases curable renders it from our point of view a very important disease. The task of the physician is in such cases a gratifying one, for although he will as a rule in the presence of chlorosis advocate a postponement of the marriage, he will seldom find it necessary to forbid it altogether.¹ Where chlorosis makes its appearance in a woman already married, the avoidance of pregnancy must be recommended until an improvement has taken place. During the act of labour hæmorrhage must be restricted as much as possible.

As regards the diagnosis, the systolic murmur present in chlorosis will hardly occasion a confusion with mitral regurgitation if all the symptoms are carefully considered. In 1900 *Rosenfeld*² published a few cases from *Naunyn's* clinic of mitral stenosis in chlorosis which were due to a congenital stenosis of the mitral orifice. The more the affection of the heart predominates in such cases over the chlorosis, the more unfavourable the prognosis naturally is. Nevertheless we shall apply *Peter's* formula quoted by *Rosenfeld*: "Filles pas de mariage, femmes pas de grossesses, mères pas d'allaitement" in the severest cases only. (No marriage for girls. No pregnancy for married women. No lactation for mothers.) From our point of view these cases are similar to acquired mitral stenosis to which we shall return while considering the acquired valvular defects which claim our attention next.

2. *Acquired valvular defects.*

Acquired diseases of the heart.—In acquired valvular diseases of the heart, heredity does not in a strict sense play any part whatever. But, as already mentioned, there are no doubt families in which demonstrably non-congenital diseases

¹Compare *Rosin*, p. 308.

²*Rosenfeld*, Ein Beitrag z. Lehre d. chlorot. Mitralstenose. Inaug.-Dissert. Strassburg.

of the heart also occur exceedingly often. This frequent occurrence is explained by the etiology, to which we will now devote a few brief remarks.

Valvular lesions are mostly the remains of endocarditic affections, which in their turn are oftenest caused by acute articular rheumatism. But the exciting agents of almost all other infectious diseases are also capable to settle on the valves and to produce endocarditis. We have only to mention gonorrhœa, pneumonia and influenza. Experimentally it has been possible to create endocarditis in animals by means of almost all bacteria, though not without previous injury to the valves. (*F. Meyer*.¹) It has also been proved that the chronic infectious diseases, syphilis and tuberculosis, may occasionally give rise to diseases of the heart. (*Michaelis*.)²

The second most frequent cause of chronic endocarditis is arterio-sclerosis; here the same process which affects the blood-vessels takes place in the valves, most frequently at the aorta. The valvular defects noticed in connection with gout are also as a rule a consequence of concurrent arterio-sclerosis. A few cases have been described where genuine uratic endocarditis has been inferred from a deposit of salts on the valves, but the presence of uric acid has been demonstrated only a few times including a case of *Lancereaux* in which however the patient in question had never suffered from gout. For this reason *Minkowski* considers endocarditis in gout to be purely arterio-sclerotic.

As experience shows that the predisposition to articular rheumatism is sometimes hereditary, and as heredity plays in arterio-sclerosis an important part, of which more anon, this explains sufficiently how it is that cardiac affections occur frequently in certain families. But neither the one predisposition, nor the other justifies the physician to withhold his consent to a marriage. His duty is, however, where such a tendency to heart-disease exists in a family, to call the attention of the parents to it, so that they may as far as possible avert it in their children either by inuring them against the rheumatic inclination or by inducing them to lead a suitable mode of life.

¹*F. Meyer*, *Experim. Endocarditis in v. Leyden-Festschrift*.

²*M. Michaelis*, *Ueber Endocarditis in "Deutsche Klinik."*

We will now pass to the most important question: how does marriage affect the patient subject to heart disease?

Already in the year 1893 one of us (*v. Leyden*) has in a lecture "On the complication of pregnancy with chronic disease of the heart" before the society of medical officers to the Charité-Hospital, taken up a position in this question, which must occupy a front place in the present contribution. Although the views expressed on that occasion have often been opposed down to the present day chiefly by gynæcologists who are as much interested in this matter as the physicians who devote themselves to internal medicine, we still think we are entitled to adhere to our opinion notwithstanding the fact that our hopes for an improvement in the methods of artificially inducing premature labour have hitherto not been realised.

Pregnancy and valvular disease.—Let us consider first those disturbances which are capable during pregnancy and labour of influencing injuriously the condition of women affected with heart disease. The number of these disturbances is very great, and we emphasize that it is not sufficient to look for one single causal factor, but that it is necessary to pay regard to the whole of the circumstances which act unfavourably on the affections of the heart. Some authors prefer to look at the matter from one point of view only; a few have accused the hypertrophy of the heart, others the insufficiency of the respiration or the upward pressure of the diaphragm, and others again, the diminution in the blood-pressure after labour. *Zweifel* has expressed himself thus: labour is an over-exertion, and this over-exertion on the part of the heart causes injuries. This factor is undoubtedly of great importance, but many others are also concerned, and any one of them in particular or several in combination may in each individual case turn out to be of decisive moment.

The threatening influences affect:

1. **The heart.**—The question of the hypertrophy of the heart in pregnant women has in medical literature always played an important part, and is playing it partly even at the present day. In France *Larcher* has first in 1825-26 laid down the theory of the hypertrophy of the left ventricle during preg-

nancy. He examined the hearts of 130 women most of whom had died in child-bed, and came to the conclusion that under normal circumstances the heart is enlarged during pregnancy, that this hypertrophy affects as a rule the left ventricle and the left auricle, that it amounts to between $\frac{1}{4}$ and $\frac{1}{3}$ of the normal thickness, and that it disappears gradually during lactation. The results of this examination, supported in France especially by *Ducrest* and *Durosiez*, have often been doubted in Germany and namely by *Fritsch*, *Löhlein* and *Wessner*. They relied chiefly upon the authority of *Gerhardt* who had demonstrated that the measurements given by *Larcher* and *Ducrest* fall within the limits of normal conditions. Nevertheless, the supposition that a certain amount of hypertrophy of the heart occurs in pregnancy finds as yet occasional supporters, and even *Macdonald* thinks that a certain degree of it is probable on account of the greater work which the heart has to perform during pregnancy. Among English authors *Peacock* is of the opinion that a certain amount of hypertrophy does exist.

Anyhow, we cannot at the present day attach any particular importance to this hypertrophy, not even in the case of women affected with chronic heart-disease. It is however in so far a point worthy of consideration as it confirms somewhat the grounds upon which it is assumed that the heart is called upon during pregnancy to perform a greater amount of work.

2. **The influence of pregnancy** upon the heart is further proved, as *Löhlein* has shown, by the fact that not infrequently accidental murmurs are observed in pregnant and puerperal women, apart from any fresh occurrence of endocarditis, which disappear soon after labour, during child-bed.

3. As regards the **activity** of the heart, it is said that its beating is usually accelerated during the last months of pregnancy.

4. Of still greater interest is the reduction of the **pulse** to 60, 50 or even 40 beats, which is noticed in puerperal women, and which was first described by *Blot*.

Blot asserts that this phenomenon occurs more frequently in multiparæ, and that it is an indication of the state of health

of the puerperal woman, but that it is not on the other hand influenced by the state of nutrition, the duration of the pains or the period of so-called milk-fever. He denied, however, its causation by some sort of exhaustion, relying for this upon the well-known sphygmographic researches of *Marey* who has demonstrated that an increase in the arterial pressure is accompanied by a diminished pulse-rate.

With all due respect to the sphygmographic results of *Marey* we must admit that observation at the bed-side rather tends to prove that the striking diminution in the pulse-rate is a sign of cardiac weakness and of a serious decrease in the blood-pressure. This is probably the prevalent opinion among experienced medical practitioners. We clinicians frequently observe an analogous slowness of the pulse after the crisis of acute diseases, oftenest in young people and even in children. We see in this a sign of a good solemn crisis, but at the same time an indication of weakness of the heart which requires the most careful treatment, stimulants and roborants as well as the best possible nourishment and quiet rest in bed. But the pulse may withal occasionally be strong and tense, and we do not desire to lay down any decision whether the blood-pressure is abnormally high or low; clinical experience is, however, incontrovertible that where the pulse is markedly slow we must apprehend conditions of syncope and collapse.

We should like to apply these experiences to the puerperal state and to regard the slowness of the pulse as a sign that there occurs in child-bed a certain weakness of the activity of the heart and of the circulation which necessitates a stimulating and sustaining procedure. It is undeniable that such a cardiac weakness must be of importance to a diseased heart and that it must favour collapse on the part of it. The profuse sweats frequently seen at the beginning of child-bed also speak for a certain measure of debility. *Fellner*¹ attributes the decrease in the pulse-rate to a diminution and deterioration of the quantity of blood associated with a relatively too large heart.

5. **Anatomical changes** in the heart, and espe-

¹*Fellner*, Die Bezieh. innere Krank. etc.

cially in the myocardium have been observed post-mortem in parturient women comparatively often, even when death was not due to an infectious disease. *Virchow* has pointed out the occurrence of fatty and other degenerations of the muscle of the heart in puerperal women, and *Ponfick* says that he has seen the anæmic form of fatty degeneration of the heart in protracted labours especially.

6. Mention must also be made that owing to the labour-pains a certain **over-exertion** may easily take place on the part of the heart. *Zweifel* especially has rightly laid stress on this point. The case of rupture of the aorta during labour, communicated by *Simpson*, illustrates the condition sufficiently. The fact that embolism occurs comparatively often in labour also points to an increased pressure in the vascular system. By most careful measurements of the blood pressure in pregnant, parturient, puerperal and suckling women, *Fellner* has demonstrated that the pressure is somewhat higher during pregnancy, that it reaches its highest point at the height of a labour-pain, falling again during the interval, and that it sinks with the rupture of the membranes in proportion to the rapidity with which the liquor amnii escapes. According to *Fellner*, the highest blood-pressure is observed at the moment the head passes through the vulva. After delivery, the blood-pressure falls to far below normal.

Finally we must remember that the administration of chloroform in labour has a debilitating influence upon the muscles of the heart.

On the whole, the conditions described above have in our opinion doubtless the result that the heart is in various ways endangered during pregnancy and labour. During pregnancy, and especially in the later months, greater demands are made upon its activity; these demands are in labour increased up to the point of over-exertion; at the end of the labour-act the action of the heart falls to such an extent that even under normal circumstances the greatest vigilance on our part is required. Where the circumstances are normal all these perturbations are more easily withstood or corrected, but it cannot be denied that they may prove disastrous to a diseased heart.

Disturbances on the part of the lungs during pregnancy.—On the part of the lungs there also arise disturbances in the course of pregnancy. In the last months of pregnancy the encroachment on the abdominal space forces the diaphragm upwards and causes thereby a diminution in the lung volume (retraction) and a limitation in the respiratory capacity. It is clear that these conditions, first appreciated by *Spiegelberg*, must have a disturbing influence upon the pulmonary circulation of the blood and upon the activity of the right ventricle. True, *Wintrich* and *Küchenmeister* have shown that the vital capacity of the lungs is not diminished during pregnancy, and similarly, the cyrtometric researches of *Dohm* have proved that the thorax is not materially lessened on account of the pregnant uterus. Nevertheless, an objective observation of the mechanical conditions of respiration is bound to give rise to the opinion that respiration appears to be hindered by pregnancy, and that in spite of the normal size of the thorax and the normal capacity of the lungs, the extent of healthy organism is encroached upon, so that disturbances are more likely to arise from that quarter in pregnant women than in women who are not pregnant.

After labour the state of affairs suddenly undergoes a change, the resistance to the respiration becomes less, the aspiration of the blood stronger, and it is not at all impossible for disturbances in the respiration and congestion in the lungs to arise in consequence, which only become pronounced gradually, that is, in the first days of the puerperium.

Changes in the blood during pregnancy.—As regards the blood, it may be mentioned that plethora or hydræmia is still generally believed to occur during pregnancy, and that the condition is capable of influencing injuriously the action of the heart.

Secretion of the kidneys during pregnancy.—Not without importance are the conditions of the renal secretion. Pregnancy predisposes to a diminution of the action of the kidneys; this may be taken to be generally the case, although naturally it cannot be proved in every instance. Indeed, pregnancy predisposes to albuminuria, swellings and œdema. These

conditions frequently become manifest in diseases of the heart by the early appearance of œdemata, the most important sign of absence of compensation; they maintain and increase the dyspnœa which often appears even under normal circumstances, towards the end of pregnancy.

If we take a general view of the above-mentioned influences and disturbances which are as a rule associated with pregnancy, we find that as regards the activity of the heart, the circulation and formation of the blood, the respiration and finally, the secretion of the kidneys, conditions are created which may easily lead to disturbances of various kinds. These disturbances are not directly obvious; on the contrary, they remain within such limits that they are compatible with a feeling of perfect health, and experience shows that healthy women bear and conquer them easily.

Nevertheless we may say that the latitude of health is limited, and under extraordinary circumstances it easily happens that the border-line is exceeded, so that full compensation cannot be said to exist.

In pregnant women who are no longer quite healthy, morbid changes take place therefore very easily. With regard to women suffering from heart-disease we may presume—and experience confirms it—that only the mild and well-compensated cases remain unimpaired in consequence of pregnancy and child-bed, but that the possibility of trouble exists for all the severer cases. We have seen that the action of the heart is threatened in many ways, and it may easily happen that the border-line of its capability is exceeded in cases of cardiac disease; and to this we have to add the difficulty of breathing and that of the renal secretion. The more severe the heart disease, the sooner consequences will ensue which may prove for the woman dangerous and calamitous.

Although these dangers begin with the commencement of pregnancy they appear at first imperceptibly, and attain as a rule a considerable degree in the second half of the term. But there are not wanting cases, though they are rare, in which decided signs of absence of compensation make their appearance in women suffering from heart-disease in the very first months

of pregnancy. These disturbances may disappear and be compensated for; as a rule, however, they grow with inconsiderable fluctuations from day to day and bring the patients into a most distressing condition which makes the greatest demands upon their physical and moral ability to endure suffering. The dyspnœa and œdema vary, the increasing tumefaction renders the patients helpless, unable to do any work, and almost unable to move about. The appetite is disturbed, and attacks of dyspnœa, particularly during the night, make sleep impossible.

Labour.—Nevertheless, experience teaches that all these complaints which grow from day to day can usually be endured until the end of pregnancy. The termination of the distressing period is anxiously awaited both by doctor and patient, and the commencement of labour-pain is joyfully welcomed. The pains of labour are cheerfully gone through since they bring release from extreme anguish; but with the end of the labour-act, with the liberation from suffering, with the desired calm, there enters also a condition of weakness, a collapse, which harbours new dangers and which not infrequently leads to a development of œdema of the lungs. If this immediate danger is surmounted, there still remains a perilous state of cardiac debility, there is still a possibility that paralysis of the heart may supervene, and it is only by very careful nursing and slowly that this painful condition can be overcome. Often enough the heart continues weak for a long time, and compensation is disturbed for a lengthy period, sometimes unfortunately for good.

The state of these puerperal women shortly after labour has some resemblance to that after the crisis of acute diseases. We have already made this comparison when speaking of the slowness of the pulse in child-bed, and we consider it necessary to devote a few more words to this point. Pregnancy, a normal physiological process, occasions especially towards the end so many disturbances and such a limitation in the normal latitude of health, that it may almost be regarded as a morbid condition. Its signification is not far removed from that of an illness and it requires just as careful treatment as an acute disease.

This comparison with the condition after the crisis of acute diseases receives further justification from the fact that pregnancy is succeeded, during child-bed and later as well, by a number of complaints which are analogous to the sequelæ of acute pyrexial diseases. Among these we may mention in particular nervous diseases, such as encephalitis, myelitis and multiple neuritis; further, chorea and polyarthritic rheumatoid affections;—a certain analogy is also present in the disease of the kidneys. Such an analogy we might also find in the circumstance that at the height of pregnancy the predisposition to fresh infectious diseases is very slight, whilst during child-bed a predisposition to purulent infections, erysipelas and severe tuberculous processes is a distinguishing feature.

Almost all authors are agreed that pregnancy is calculated to produce fresh and untoward complications in patients who suffer from chronic heart-disease. Of course this indictment does not apply—or only exceptionally so—to the more benign and perfectly compensated cases of such affections of the heart. These are so much like the normal, healthy state that they can endure the pregnancy quite as well as women in a perfect condition of health and without any particular difficulty, and it is conceivable, as *Wessner* says, that many such cardiac diseases can pass unrecognised from the beginning of the pregnancy to the end of the puerperium because there are no symptoms pointing to disease of the heart. It is however totally different with the severe forms of chronic heart-disease which manifest already signs of disturbed compensation. These cases undergo an aggravation almost without an exception, and become finally more or less dangerous to life; in fact, a considerable number of these patients succumb directly as a result of pregnancy and child-bed. Although there had already existed a severe form of heart-disease it is by no means justifiable to assume that a similar aggravation or even death would have happened, had there been no pregnancy. Purely objective observations, as well as the study of the processes involved, show sufficiently clearly that the condition of women suffering from such diseases of the heart is considerably worse after pregnancy and child-bed.

Macdonald says: "In all the cases of heart-disease which

have been recorded in this work¹ it will be observed that if the lesion was at all severe, the labour was found to be invariably accompanied by extreme cardiac irregularity, with also a feeble irregular and intermittent pulse, much dyspnœa and cyanosis. In a certain proportion of cases unconsciousness was noticed, the patients having the appearance of persons under the influence of chloroform. In some cases the perturbation of the circulation was such as to end during the labour, in sudden death. More frequently however, we notice that the confinement was tided over and a temporary but very frequently delusive improvement succeeded it. Where death results in cardiac cases the post-mortem examination reveals almost invariably pulmonary congestion, especially of the bronchial mucous membrane, and pulmonary œdema. Often also we find apoplectic extravasation of blood into the lungs of recent or of older date, and occasionally pneumonia, and very frequently pleuritic effusions."

The experiences also of other authors confirm that death seldom happens during pregnancy; labour at term or premature labour is the general issue. The real danger begins at or after labour. Frequently death occurs during the labour act, and more frequently still after its completion. The most frequent causes of sudden death are œdema of the lungs, and paralysis of the heart. Later as well, even after many weeks or months, death may occur in consequence of a permanent aggravation in the compensatory disturbances through dropsy, embolism or infarcts.

Many observers believe that the complaints of heart-diseased women who become worse through pregnancy are relieved immediately after labour, and that the condition of the puerperal woman, if no fresh infarcts are formed, is consequently much improved. *Fellner* also shares this optimistic view of most gynæcologists, a view contrary to that held by internal-medicine-clinicians. This is the result of the difference in the material observed by the two classes of physicians, a difference about which we shall again have something to say. The feeling of relief is certainly striking, and the knowledge that an exacting

¹The bearings of chronic disease of the heart upon pregnancy, parturition and child-bed, by *Angus Macdonald*. London, 1878, p. 201.

task is done with, inspires the poor patient with renewed hope. But the condition is nevertheless still dangerous, and the longed-for quick improvement often never comes.

Interruption of pregnancy.—Immediately after the confinement there ensues, as already mentioned, a state of weakness, a more or less marked collapse, which can only slowly be overcome. The cause is plainly visible. The over-exertion of the heart during labour, the disordered compensation, continues undiminished after the labour is over, and, moreover, the psychical condition, the moral fatigue must also not be forgotten. Through the long continued period of suffering, growing worse day by day during the later part of the pregnancy, through the weary time of anxious waiting for the unknown end to come, the moral resistibility is exhausted, and the period of excitement is succeeded by one of tiresomeness which contributes to the general state of collapse.

Having now pointed out the dangers which confront women suffering from affections of the heart during pregnancy and child-bed, we must turn our attention next to the important practical question: what are the ways and means to be adopted in order to avert or diminish these dangers?

Macdonald has accurately described the duty of the medical man in such cases when he said: "It is certainly devoutly to be wished for that if possible—given that one of our patients is the victim of a special cardiac lesion—we should be able to predict what are the special additional risks, if any, to which the pregnant parturient and lying-in conditions expose her, and what are the prophylactic or therapeutic measures we are bound to adopt so as, if practicable, to avoid or diminish such risks." (P. 4. l. c.)

If a pregnant woman affected with heart-disease begins to manifest signs of absence of compensation the most careful and suitable treatment must be instituted to re-establish compensation and to maintain it so re-established. This task does not consist merely in telling the patients to drink plenty of milk and in prescribing for them *digitalis*, but it is not possible to enumerate here all the necessary details.

The question which concerns us most is whether the normal

end of the pregnancy should be awaited or whether and under what special circumstances artificial premature labour may or should be induced? The whole discussion turns round this question.

It is well to make the preliminary observation that in women with heart disease miscarriage occurs comparatively often; it almost appears as if this were nature's attempt to effect a cure.

Artificial premature labour.—The first to recommend the induction of artificial labour was *Da Costa* who in 1827 saw an immediate improvement after a spontaneous premature labour in the 8th month in a case where an aneurysm of the heart which had existed for some time underwent a considerable change for the worse during pregnancy. Later, *Hofmann* (*Neue Zeitschrift für Gyn.* XIV., p. 386) simply accepted this proposal of *Da Costa* despite its vagueness. As a matter of fact, the operation has several times been performed on account of "heart-affections." Most gynæcologists have given utterance to their opinions on the point, but the indication for artificial premature labour has been recognised in a very limited degree only.

Even *Macdonald* who shows a deep medical understanding of the enormous importance of the complication in question expresses himself thus: "Premature labour should seldom or never be recommended, because it is so much more likely to do greater harm by disturbing the action of the heart and the condition of the lungs than any good it might produce by terminating the evil effects of the pregnancy. It is always to be remembered that relief of symptoms is not certain after delivery or anything like certain. The only conditions which seem to warrant the induction of premature labour, are the presence of influences, which unduly distend the abdomen and thus keep the diaphragm in a state of continuous elevation." (P. 206, l.c.) *Macdonald* is therefore opposed to premature labour not on its account, but on account of the dangers which accompany it. He confines himself to recommending that women and girls suffering from heart disease should not be permitted to marry (an advice which is seldom accepted), that they should during pregnancy be treated and nursed most carefully, and that labour

should when it does arrive be expedited and facilitated as far as possible by the use of forceps and chloroform.

Spiegelberg thinks that artificial premature labour is permissible in cases of aortic defects, and justified, even necessary, in mitral lesions under certain circumstances. According to *Löhlein* the indication for premature labour is present in both kinds of heart-disease in the same manner: (a) if unfavourable conditions have developed entirely or partially in consequence of the pressure of the uterus or of the upward pushing of the diaphragm into the thoracic cavity; (b) if the death of the mother is shortly expected (in such a case, however, the premature labour is likely to come too late).

Schleyer says with regard to artificial premature labour, that it ought to be restricted to rare cases only. Sometimes it is necessary to have recourse to it, but seeing that the results have so far not been very satisfactory it is advisable to admit the indication as sparingly as possible. *Dohrn* thought that as a matter of principle we should adhere to an expectant attitude.

On the whole it may therefore be said that modern gynæcologists recognise the indication for artificial premature labour in complications of pregnancy with chronic heart disease, but only to a limited extent.

There are two reasons why opinion of the indication of artificial premature labour is so reserved: 1. the dangers which the operation presents for both mother and child; 2. the undervaluation of the dangers which pregnancy involves in women with chronic heart disease. In point of fact, we think that these dangers are underrated by most authors, and that one of the principal causes of this under-estimation is the dissertation by *Wessner*. This author attributes to the complication only a slight injurious influence. "The cause of the unfavourable influence of pregnancy on the affection of the heart does not lie so much in either the increased activity of the organ resulting from the pregnancy, or the sudden fluctuations in the blood-pressure occasioned by the labour act, or in the high position of the diaphragm, as in the psychical and physical over-exertions of the labour process which have a reacting influence upon the heart. But statistics show that by far the greatest number of cases withstand these

over-exertions without any particular injury. It rarely happens that a cardiac defect succumbs to pregnancy or labour as such; as a rule it is severe forms of heart disease which we then have before us, and secondly complications." *Wessner* concludes therefore that the prognosis (in complications of chronic heart disease with pregnancy) is for both mother and child considerably better than it is generally believed to be, and that the induction of premature labour does not appear to be justified. *Fellner* in his latest work expresses the same opinion.

As we have already mentioned, we cannot at all agree with these views and conclusions arrived at in virtue of the apparently favourable statistics of the gynæcological clinics. That these statistics appear favourable is to a great extent due to the different character of the material. Pregnant women with heart disease seek as a rule admission into gynæcological clinics shortly before their expected confinement, that is, at a time, when the natural termination of the pregnancy, even where there are fairly severe disturbances already present, is not likely to be long delayed. Under such circumstances it is only natural that if at all possible the induction of premature labour should be avoided, considering that notwithstanding recent improvements the operation is still a rather serious one. On the other hand women with heart disease who are pregnant come under the observation of the internal clinician on account of their disease, and the latter demands the earliest possible artificial delivery if the illness can no longer be combated by the usual therapeutic agencies. We must also return once more to the other point upon which *Wessner* relies in his assertions, namely that a large number of cardiac affections are overlooked in pregnant women because they do not make themselves apparent by any symptoms or disturbances. This fact is perfectly true, but it must not be taken into account with regard to our subject and with regard to the question of artificial premature labour, because it is only such cases of heart disease which come into consideration at all, that have already led to disturbances of compensation.

That heart disease, and especially valvular lesions, may exist without markedly affecting the whole organism is a fact

well enough known; it is just what happens in the mild cases with full compensation. Such patients experience no troubles, they feel perfectly well, can work, move about and live like people whose health is unimpaired. Analogous is the behaviour of pregnancy towards the cardiac defect. In mild, fully compensated cases pregnancy is endured quite as easily as by women who are in perfect health, and there is no reason to interfere with them. The normal course of pregnancy and parturition is as a rule not interrupted. But experience teaches that with repeated pregnancies injury supervenes in time and that a more or less severe and lasting defect of compensation arises in consequence.

Totally different is the behaviour of the severe cases of heart disease which no longer possess an undisturbed compensation. When such women become pregnant the signs of the absence of compensation increase in severity and assume in the latter months of the utero-gestation unendurable proportions. Here the pregnancy is undoubtedly injurious, in other words, the destruction of compensation increases, and the most careful treatment is frequently unable to re-establish it. It will now be the duty of the physician to form an opinion whether the patient will be able to withstand the burden and suffering till the natural commencement of the labour-pains, or whether the defect of compensation will grow to such a degree that death will most probably result.

If some authors say that the life of the mother must be in absolute danger we cannot take this to mean that this danger must be an immediate one (since the life-saving interference would then arrive too late) but that it must be anticipated with certainty or with the greatest probability. We cannot decide this literally but every experienced conscientious and observant practitioner must be able to come to a decisive conclusion. Statistics of internal clinicians show that of severe cases of chronic heart-disease nearly 40% die in consequence of pregnancy and parturition. This figure is big enough to warrant us in saying that in every pregnant woman suffering from heart-disease in whom defects of compensation exist and are on the increase, the indication of artificial premature labour is quite

justified. The life of the child which is, by the way, always in danger even where the pregnancy of women with heart disease follows a normal course is of no consequence in comparison with that of the mother; surely the latter or her husband has a perfect right to renounce the happiness of having children if by an artificial interruption of the pregnancy the life of the pregnant woman can be saved or prolonged.

We are of the opinion that in all cases of pregnancy complicated with heart-disease in which an absence of compensation occurs, that keeps increasing in spite of careful treatment and is likely to attain serious proportions, the interruption of the pregnancy is indicated and justified. If threatening symptoms appear already in the first half of the pregnancy, artificial abortion takes the place of artificial premature labour. The practitioner will doubtless prefer the former seeing that it is an easier operation and one which can be finished more quickly.

As regards now the dangers to which artificial premature labour exposes mother and child, we must admit that in accordance with the opinion of gynæcologists we have not in recent years made much progress in this respect. *Bossi's* method seemed at first to promise a great deal, but on careful examination it has been found that the old methods which have stood the test of time are after all preferable. (*v. Bardeleben.*)¹ And as far as the weariness is concerned which is associated with the long duration of an artificial premature labour, we are not disposed to attach very great importance to it, since parturient women who have suffered considerably are as a rule not very sensitive, and because they are quite prepared to endure a fresh ordeal in the hope that it will mean the end of their troubles. On the other hand we desire to point out that the gain of a few weeks in such a distressing condition as pregnant women with heart disease have to endure, is an enormous advantage, considering that the continuation and aggravation of the distress for several weeks longer exhausts the physical and moral strength of the patients to such an extent that after the confinement they break down completely in body and soul.

¹*v. Bardeleben*, Wesen u. Wert der schnellen mechan.-instrum. Muttermundserw. etc. Arch. f. Gyn. Vol. 40, No. 1.

It is not feasible to lay down special rules with regard to the different forms of valvular disease or to formulate different indications respecting marriage according to the seat of the lesion. Statistics show that most deaths occur during pregnancy complicated with mitral stenosis. But the reason is mainly because mitral affections are altogether the most frequent valvular lesions in the female sex. What must influence our opinion decisively is the question: Is there an incompetence of the muscle of the heart or not? Many women with well compensated valvular defects tide over repeated pregnancies without developing any disturbance in the compensation. We agree with *Fellner* in holding the prohibition of marriage in well-compensated cases of heart disease unjustified and harsh.

Prohibition of marriage.—Having in the above remarks discussed the attitude to be taken up by the physician in the presence of pregnancy complicated with heart disease, we must now devote a few words to those cases where we are compelled at an earlier stage to put in a word of advice. We refer to women suffering from cardiac affections whom it is our duty either to dissuade from marrying or if they are already married to warn against allowing themselves to become pregnant. It is only in the severest cases that the physician is called upon to oppose a marriage with all possible energy. Just because we can only advise we must always remember that as a rule our orders are not carried out if they involve as in this case sorrow and disappointment. It is therefore necessary that we should bear in mind that our warning words may, if not accepted, cause more mischief than good because to the real danger occasioned by the disease an aggravating element would be added by the fear and worry of the patients who have possibly been hitherto ignorant of their condition and of its serious character. Besides, considering that in the majority of cases we should be against the marriage of women affected with heart disease on account of the dangers which we anticipate from a possible pregnancy, we can avoid the infliction of anguish upon our patients by permitting the marriage and by instructing the husband to avoid conception for as long as possible.

Prohibition of pregnancy.—Finally we must remember that an absolute prohibition of pregnancy will only very rarely be listened to; women do not like the idea of renouncing maternity altogether. But when a child has been born and the family is not without an heir, the physician may expect that his advice to avoid further pregnancies will be adopted, especially if the mother has become aware that her condition has deteriorated in consequence of the first pregnancy. We know that a complete renunciation of all maternal happiness is to many a sore disappointment, and this is, particularly in women with heart disease, likely to be as severe or a severer trial than a single pregnancy which under advantageous circumstances may possibly take a favourable course.

It is our principal concern in every case to study the pros and cons most carefully and to remember that though we must not exhibit a want of energy we must at the same time endeavour not to deprive our patients of every joy of life.

3. *Diseases of the Myocardium.*

We will now consider the diseases of the muscles of the heart and their relationship to marriage.

Weakness of the heart after infectious diseases.—In the previous chapter we have mentioned that in the course of many infectious diseases the settlement of bacteria on the endocardium is the cause of the heart disease; and now we wish to point out that some infectious diseases injure the muscular wall of the heart itself through the action of the toxins. Diphtheria, influenza, more rarely typhus and other infectious diseases are capable of giving rise to curable but nevertheless prolonged weakness of the heart. The presence of minute myocarditic deposits demonstrated some time ago by one of us (*v. Leyden*) in such cases does not suffice for its explanation, and we are obliged to assume that it is caused by toxic action. This toxic myocarditis—for we must look upon the disease as one analogous to toxic neuritis—is as a rule demonstrable only during the attacks of weakness of the heart and is even then frequently confused with purely nervous con-

ditions. This weakness of the heart manifests itself either by acute conditions of cardiac collapse with syncope and a small slow pulse, or by stenocardiac attacks with a quick irregular pulse, while in the intervals between the attacks there are absolutely no changes demonstrable in the heart. If we are therefore entitled to admit the existence of such a toxic myocarditis, we must exercise our medical authority towards obtaining the postponement of any projected marriage until the last signs of the intoxication have disappeared. In the case of married persons, sexual intercourse must be restricted as far as practicable with a view to preventing the occurrence of pregnancies. Considering that the prognosis is on the whole favourable, and that it is therefore necessary to impose a temporary abstinence only, our advice will as a rule be followed.

Exophthalmic goître.—As this disease also rests upon a chronic and toxic action on the heart we will devote to it a few words.

According to *Möbius*, "the victims of exophthalmic goître suffer and die on account of their hearts. The question of comparative cure is decided by the state of the heart." The toxin of *Graves's* disease acts therefore mostly on the heart and the blood-vessels. Where the affection is well-marked the subject of marriage is hardly likely to arise as the symptoms cause such a disfigurement that the existence of the disease is plainly visible, and the condition of the patients is just as much a real obstacle against their marriage as is that of sufferers, f. i. from well-marked skoliosis, who do not on account of their deformity marry as easily as normal individuals. Although the cause of the disease is now after many years of useless theoretical wrangling rightly attributed to a dystrophy of the thyroid gland, we are still no wiser with regard to its special etiology. Comparatively often there appears during pregnancy a bronchocele which disappears at the end of the term of gestation; sometimes it remains stationary, and sometimes it returns with repeated pregnancies. Exophthalmic goître does not commence during pregnancy any more frequently than it develops from a bronchocele without clinical manifestations.

Where there is pronounced tachycardia pregnancy is natu-

rally bound to weaken the organism further still. A curing influence such as was described by *Charcot* may possibly be explained after the analogy of other examples in pathology. A chronic condition becomes acute and returns to the normal after the acute stage has run its course. The observation of *Charcot* of a disappearance of *Graves's* disease has however until now remained the only one known in literature. The complete disappearance at the end of pregnancy of bronchoceles which had existed previously has been observed more frequently. *Van t' Hoff* describes a case in which the pulse-rate diminished considerably in the lying-in period, but went up again shortly afterwards. There had been a premature labour of an unripe embryo. On the other hand *Jeoffroy* has seen a material aggravation of the clinical picture. In any case, the prohibition of pregnancy will have to be insisted on if a previous gestation was the cause of a visible aggravation of the condition.

Graves's disease attacks by far more women than men, and for this reason the complication with pregnancy is of the greatest interest to us. That trouble and sorrow during the married state are in such an illness as exophthalmic goitre which depends to a great extent upon psychical emotion, bound to exercise a very great influence is quite evident. The husband who suffers from this affection will naturally receive much injury from pecuniary and business worries. Sexual intercourse affects the patients, where cardiac symptoms are prominent, quite as much as if they were suffering from heart-disease proper. Considering that the malady is easily inherited marriage should be avoided if possible.

Nicotine and alcohol.—Of other toxic effects on the heart we have to consider those of nicotine and alcohol; both damage the muscles of the heart in different ways. The consequences of the action of nicotine manifest themselves mostly by a disturbance in the function of the heart-muscle which disappears gradually after the cessation of the abuse of tobacco. These cases are therefore of little import as regards our theme, seeing that we can as a rule help our patients by recommending them to give up smoking. It is different as regards alcohol. Here we have to decide whether or not the injury caused to

the heart by the abuse of alcohol has gone so far that it will not be removed by the discontinuance of the pernicious habit. With regard to the slight cases we may say the same as we said with regard to chronic nicotine intoxication; the complaints may cease as soon as the toxic action of the alcohol has disappeared. In this connection we may mention that a prudent marriage often acts as an inducement to restrict the deleterious indulgence in tobacco and alcohol, and that from this prophylactic point of view the married state is of considerable advantage to the health of these individuals.

Chronic myocarditis.—But where the over-indulgence in alcohol is continued, a genuine myocarditis develops with anatomical changes in the heart-muscle or in the kidneys which are incapable of restitution. Frequently there arises in association with this condition a chronic form of alcoholic nephritis, with a group of symptoms which resemble closely those of cirrhosis of the kidney. Following upon attacks of cardiac asthma which become more and more frequent and serious there appear finally symptoms of congestion which lead under dyspnoea and dropsy to a fatal issue through the complete incompetence of the myocardium. Should it happen that we have before us patients with such chronic myocarditis, an affection which is, by the way, observed as a rule in people of an advanced age only, it will be our duty to dissuade them from marriage, be they males or females. As to recommending the avoidance of pregnancies, we shall probably seldom be in the position of having to do so, since conception is likely under the circumstances to take place in very few women, seeing that in the majority of cases metritic changes exist which have been produced by the general congestion.

We shall return in the chapter on arterio-sclerosis to the special arterio-sclerotic affections of the myocardium.

Syphilis.—Syphilis does occasionally give rise to well-marked myocarditis, in addition to the injuries to the muscle of the heart occasioned in syphilitic affections through the endarteritis of the coronary arteries, which injuries are no different than those of ordinary arterio-sclerosis. At the beginning of the illness, antisyphilitic treatment may often prove successful,

or at least sufficiently so to arrest the progress of the disease. As to the very severe cases, the same rules apply which we laid down for chronic myocarditis generally.

Fatty degeneration of the heart.—Of especial importance to our subject are further the cases of “fatty heart.” By this term we understand the disturbances in the activity of the heart, which frequently occur in obese people without any real disease of the myocardium, but in whom there arises in the further course of the affection, in consequence of the prolonged greater strain on the heart, hypertrophy and dilatation of the organ, so that the deposit of fat on the heart-muscle is only of secondary importance. To these patients particularly we are as a rule able to do good by instituting the proper treatment which consists above all of a careful dietetic system in combination with physical exercise, and this good we can achieve even in those cases where the subjective complaints are already relatively very considerable. Generally speaking, it will not be necessary in such cases to dissuade from marriage. On the contrary marriage may reasonably be expected in the case of many “luxurious livers” to be of decided benefit, seeing that it may possibly occasion an alteration in their mode of life and especially in their dietetic indiscretions.

Overexertion. — In the presence of disturbances in the activity of the heart-muscle which we observe sometimes *f. i.* after physical over-exertion, our attitude must depend upon whether we may expect a restoration of the function on the disappearance of the injurious influence, or not.

Incompetence of the heart-muscle.—In very severe cases of insufficiency of the myocardium it is immaterial for our decision on what basis they rest. Whether there exists a degeneration of the muscular wall of the heart which produces the cardiac debility, whether we have before us a heart which has become incompetent in a case of scoliosis, whether it is the heart of an alcoholic subject which begins to fail, or the heart of a nephritic patient which has come to the end of its working capacity, is of no consequence as far as our present purpose is concerned, because the arrangements to be made are in every instance alike; they vary according to the severity of

the case between prohibition of marriage, prohibition of sexual intercourse and induction of premature labour.

The neuroses of the heart we will consider in conjunction with true angina pectoris in the section on diseases of the arteries.

The sexual intercourse of married individuals affected with heart disease.—Although the subject of sexual intercourse during married life is treated in detail in another chapter of this work, we cannot quite avoid making a few remarks in that direction bearing upon our theme. That a considerable alteration takes place in the blood-vascular system as a result of the sexual act is well-known and also proved. (*Mendelsohn.*) In man it is particularly necessary in this respect to decide each case on its merits. In very many individuals marriage does not perhaps occasion any difference in the mode of their sexual life, but in others, who as bachelors were inclined to venereal excesses a well-regulated married state usually means a greatly improved state of affairs. On the other hand, married men have a constant opportunity for sexual intercourse and a great deal depends on the nature of the wife whether abstinence is practised more or less. Excess is injurious, and it is the duty of the medical man to warn against it those who are subject to heart disease, and to recommend moderation. The occupation of separate bedrooms is in such cases advisable. But it is also well to remember that the sexual requirement varies in different individuals according to their temperament and that exaggerated abstinence often does more harm than good. As the wife is on an average the more passive partner at the exercise of the sexual act, it will often be advisable, where she is the victim of heart disease, for the medical man to give to the husband the necessary instructions.

We must now briefly refer to the cases in which it is imperative to recommend to women suffering from heart disease the avoidance of pregnancies. As absolute continence from all sexual intercourse is indicated in the severest cases only, and as on the other hand there is no safe protection against the occurrence of conception in any other but absolute continence, conception must be prevented as far as possible. This is not the

place to enter into a detailed description of the various methods which are being adopted towards this object, but it is necessary to point out that the most prevalent custom by which conception is avoided, namely the coitus interruptus, is absolutely to be condemned. It has been proved that this form of intercourse is capable of causing even in healthy women cardiac complaints and even severe neuroses of the heart. (*Kisch.*) This is much more likely to happen in women suffering from heart disease. The cause of the injury lies in the circumstance that an unbearable amount of attention, while the excitement is at its highest point and the desire as yet ungratified, is bound to cause a very severe strain on the heart.

Lactation.—We come now to the question of lactation. Women with heart trouble must as a rule be prohibited from suckling, but there may be cases now and then where a woman with a well-compensated cardiac defect has undergone the ordeals of pregnancy—if we may say so—physiologically, and where lactation with its accompanying regular habits necessary in the interest of the child, will probably be of decided advantage. Additional help can also be expected from the well-known tendency of the genital organs to return to their normal condition more successfully in women who suckle their children. The physician will therefore have to use his discretion in every individual case. *Fellner* has shown that considerable fluctuations in the blood pressure take place during lactation, and we must consequently be very careful on the point. Now-a-days when so many mothers unfortunately omit to suckle their own infants for no other reason than their convenience, there is not much fear that the advice to abstain from lactation will not be strictly followed.

II. Diseases of the arteries.—*Arterio-sclerosis.*—Of the diseases of the arteries those which have any bearings on our subject are arterio-sclerosis and aneurysm.

Heredity plays in arterio-sclerosis a more important part than in the diseases of the heart described above.

Just as very few people would break off a contemplated marriage with an individual in whose family there have been frequent cases of arterio-sclerosis, so the physician has no right

to warn against the contraction of such marriages, as he would be justified in doing in cases of tuberculosis or insanity. For heredity is not the only powerful factor; it only creates the foundation for the disease which may possibly be averted by avoiding the well-known injurious influences which are demonstrably of the greatest importance in the etiology of arterio-sclerosis, such as f. i. alcoholism.

Every individual acquires in the end a more or less pronounced degree of arterio-sclerosis if he lives long enough, in other words, the atheromatous degeneration of the blood-vessel walls may be regarded almost as a physiological accompaniment of advanced age. We look upon arterio-sclerosis as a diseased condition only if it occurs in comparatively young people and if it occasions disturbances of health. It is naturally impossible to lay down fixed numerical age-limits. But as a rule marriages are concluded at an early age, that is, at a time when arterio-sclerosis is rare, between the ages of 20 and 30. The injurious influence of old-age marriages is well-known, and we are not far wrong if we attribute this injurious influence to a great extent to the sexual intercourse. Men of 50 and upwards who have often been previously sexually abstemious marry as a rule women considerably younger than themselves. The sexual connexion is carried out regularly and generally too often for a man getting on in years. The desire is out of proportion not to the sexual capacity of the individual in question, but to the amount which is good for him. Occasionally such marriages are entered into for the sole desire to have an heir, and this wish is then the cause of an exaggerated sexual intercourse.

This is why we often see elderly men who had up to their marriage been considered strong and healthy die soon after their entrance into such new and unaccustomed conditions.

Each sexual act causes an alteration in the blood-vascular system, a not inconsiderable increase in the blood pressure, and namely more in the man than in the woman. This increased blood-pressure which is easily withstood by the elastic vessels of young people is too much for the atheromatous arteries of the aged. To this is also added the unavoidable over-exertion of the respiration and of the heart's action. Sudden death during

the performance of coitus is by no means rare among old men. It is the duty of the physician under such circumstances to speak a word of warning—particularly so, considering that it is chiefly in the case of men who think that there is nothing the matter with them, and in whom the arterio-sclerosis gives rise to no clinical symptoms, that this necessity exists—and to recommend extreme sexual moderation. Where the prohibition of marriage is called-for, a great deal naturally depends on the extent of the disease and on its situation, just as the general prognosis of the malady also depends upon the seat of the lesion.

The more vital the organ whose blood-vessels have become sclerotic the more dangerous the illness. If we differentiate, like *Huchard*, arterio-sclerosis according to its situation, we find that patients who exhibit a cardiac¹ or cerebral picture seem in greater danger than those who present the type of renal manifestations. The latter, again, seem in greater danger than the patients who show only outward signs of arterio-sclerosis, but no clinical symptoms or only such that proceed from less vital organs. The most important in any case is the sclerosis of the coronary arteries or their manifestation, true angina pectoris. There are doubtless cases of true angina pectoris in which after one severe attack the symptoms diminish gradually in consequence of the proper treatment and a judicious mode of life, so that they appear at very long intervals or disappear even altogether. Under such circumstances marriage and its consequences are apparently well borne. But after an interval extending over some years a relapse occurs, or a slowly-growing chronic heart-disease develops, with asthmatic conditions which force the angina pectoris into the background. We have then a chronic myocarditis with dilatation and with the symptoms of cardiac asthma.

We can distinguish in angina pectoris several forms of its course: (1) Acute cases: Sudden death, rapid closure or considerable stenosis of the coronary arteries; (2) Sub-acute cases: gradual stenosis of the coronary arteries, fibrous degeneration, changes in the heart, especially at the apex; (3) chronic cases, fibrous myocarditis; (4) mild cases of angina pectoris. In the

¹*Cf. Braun, Therapie d. Herzkkr.*

first 3 forms the physician is entitled and even obliged to prohibit marriage unhesitatingly. But the symptoms are generally so severe, the attacks so portentous of evil, and the intervals between them so distinctly productive of a feeling of illness that the patients are hardly likely to think of marriage. It is different in the mild cases. There we have chiefly difficulties of differential diagnosis to contend against, for similar symptoms occur in other cardiac affections as well, and there undoubtedly exists an angina pectoris neurasthenica vasomotoria. Where the angina pectoris is a symptom of such another disease of the heart, the rules laid down above are to be applied. In mild cases of true angina pectoris the physician will advise against marriage; married individuals will have to be recommended moderation, especially in sexual intercourse. Where the doctor thinks that there are indications of sclerosis in the cerebral arteries he must adopt the same attitude as in cases of severe angina pectoris. The arterio-sclerotic cirrhosis of the kidney dictates the same precautionary conduct as that indicated in granular atrophy generally which will be discussed in another part.

Especial care is necessary in cases of paroxysmal tachycardia. The main thing in this complaint is probably a correct diagnosis, since a confusion with true angina pectoris is sometimes possible, and occasional attacks of quickened pulse frequently occur in various cardiac affections. If we understand by paroxysmal tachycardia only those cases in which there is no organic disease, and which are consequently purely neurotic, there is no reason to oppose marriage as a matter of principle. Where the attacks happen in people already married, the doctor must investigate whether they are not perhaps associated with sexual over-indulgence and give his instructions accordingly. Pregnancy need not be prohibited in principle, but if the attacks should during utero-gestation become alarming or unmanageable, it might become imperative to induce premature labour.

If we follow *Rosenbach*¹ in distinguishing two forms of bradycardia, namely: (1) the functional form which appears

¹*Rosenbach*, Die Krankheiten d. Herzens u. ihre Behandlung.

as a consequence of the irritation of the inhibitory system of the heart and which is in so far always benign in its course seeing that it can take place only where the irritability of the myocardium is normal, and (2) the form which is produced by a change in the irritability of the heart-muscle or of the heart-centres themselves and which is as a rule irreparable, or at least prognostically very unfavourable,—if we admit the existence of these two forms, then the indications arising in regard to marriage are quite clear. In the first form we must apply the conclusions which we adopt in nervous paroxysmal tachycardia, the second form is always a sign of myocardic incompetence, and it necessitates therefore the precautions which are dictated by cardiac insufficiency in general.

Where attacks of tachycardia or bradycardia appear therefore as symptoms of organic heart-disease or of pronounced arterio-sclerosis they are signs of bad omen; if one attack is surmounted it is advisable, if pregnancy exists, to interrupt the same before further disturbances of compensation arise which would render medical help tardy and nugatory.

The more active part in sexual intercourse is played by the husband, and for this reason he is in greater danger than the wife. On the other hand, pregnancy causes in the latter an alteration in her normal condition which is to begin with the limit of what may be regarded as physiological.

In the etiology of arterio-sclerosis the increase in the blood-pressure is given as one of the principal causes, without regard to the circumstances upon which this blood-pressure depends; on the other hand it is proved that women are comparatively far more rarely attacked by arterio-sclerosis than men, and that women who have undergone pregnancy extremely often do not in spite of the increase in the blood-pressure at every pregnancy suffer from the disease more often than those who have never borne children. Nevertheless this physiological increase in the blood-pressure during pregnancy is bound to have injurious if not dangerous results where it affects a woman whose blood-vessels are already diseased. But conception seldom happens in women with well-marked arterio-sclerosis; such women have generally reached the menopause.

An existing arterio-sclerosis may during pregnancy become aggravated. Apart from the increased demands which gestation makes upon the circulatory apparatus, it is the minor ailments which healthy women withstand easily, that play an important part in the case of those affected with arterio-sclerosis. It is sufficient to mention the frequent tendency to nausea and vomiting as an example of the best-known of these ailments.

If the pregnancy itself is tided over without any material aggravation of the complaint, danger may be caused by the parturition. Every excessive physical exertion is capable of producing the rupture of a sclerotic artery in a vital organ as illustrated by the above-mentioned case of *Simpson*. Whether the abdominal pressure is applied during defæcation or whether it undergoes a great strain during the expulsion stage of labour is immaterial as far as the result is concerned. The duty of the medical attendant in such cases is therefore to relieve the parturient woman of the exertion of the labour, that is, to complete the latter artificially and under an anæsthetic, which is under the circumstances the lesser of two evils.

Aneurysm.—With regard to aneurysm there is on the whole nothing more to be said than was said with regard to severe arterio-sclerosis, namely that it is the duty of the physician to warn against marriage, to recommend the utmost moderation in the exercise of sexual intercourse and to prohibit pregnancy as far as possible.

III. Diseases of the veins.—The acute affection of the veins, that is to say, phlebitis, does not concern us in our present theme. As regards phlebo-sclerosis the same rules are applicable as were laid down with respect to arterio-sclerosis.

Schrötter is right in pointing out that phlebo-sclerosis presents no clinical symptoms, for it is merely one of the manifestations of general angio-sclerosis or because it is observed in connection with diseases of the heart. As a rule sclerosis of the veins is only recognised post mortem by a microscopical examination. The tumours of veins, their tuberculous and syphilitic affections need not be discussed in this place, for not the seat of the lesion is the main and decisive thing in these diseases,

but its etiology, particularly as isolated disease of the veins hardly ever occurs in these cases.

The most frequent and most important disease of the veins is their dilatation. *Schrötter* restricts the name "varix" to the sacculated distentions, and calls the uniform dilatations, the so-called varicose veins, phlebectasis. Among the latter the enlargements of the veins of the lower extremities occur most frequently. Owing to their position while the body is in the erect posture congestion takes place in them more easily than elsewhere. Pregnancy plays a very great part in the etiology of varicose veins. Consequently the condition is noticed much more frequently in women than in men. Where a dilatation of the veins exists already it undergoes aggravation as a result of pregnancy. But the physician will hardly ever find himself in the necessity of having to prohibit a marriage on this account. In the case of the lighter forms of ectasis bandages are generally sufficient, and extreme dilatations are as a rule present in older women. The danger lies in the possible occurrence of fatal hæmorrhage, in inflammation and ulceration, but above everything in thrombosis during the puerperal state. The complaints in these severe cases are however so great that surgical treatment *i. e.*, excision of the veins, appears desirable if not necessary, especially as the results are not unsatisfactory. In any case, it is the duty of the medical attendant to watch most carefully the puerperium of such women. The recommendation of *Lennander*¹ that the foot-end of the bed should be by about 10 to 50 cm. higher is worth adopting. The period of child-bed should extend over at least 14 days; this applies particularly to the women of the working-classes who are in the habit of getting up as a rule during the first week in order to follow their occupations. The doctor will often have to point out the long duration of an eventual illness if he cannot otherwise persuade the patient to prolong her lying-in period as much as possible.

Next in frequency is the formation of varicose veins in the hæmorrhoidal plexus. Here also pregnancy acts injuriously; but as a rule the varicosities abate at its termination to the same

¹Quoted after *Schrötter*.

extent as they increased in the course of it. Extreme cases belong to the domain of the surgeon, of course as long as there is no pregnancy existing.

In man there is finally to be considered the varicocele, or the formation of varicose veins in the plexus pampiniformis. That it is capable of producing impotence is denied by *Moritz*. At any rate, it can, if at all extensive, interfere with the sexual act and operation is therefore in such cases to be recommended.

What has been said here applies to the cases of essential varix. (*Mahillon*.) If the phlebectasis is only a symptom of other organic diseases, if it is the result of cardiac or pulmonary affections, or of those of the liver or the kidneys, our standpoint must vary accordingly.

IV. Lymphatic system.— In conclusion, a few words on the diseases of the lymphatic glands and lymphatic vessels.

The acute infectious diseases do not come within our present survey. They must be treated in accordance with the principles generally adopted. We will however mention the so-called phlegmasia alba dolens which occurs comparatively often during child-bed. The opinions of authors on this affection vary. *Freund* sees the primary cause in a congestion of lymph (lymphatic stasis) which leads finally to a pressure-thrombosis of the crural veins, whilst others, f. i. *Fehling* regard the venous thrombosis as the cause of the disease.

Just as acute infectious diseases spread preferably over the lymphatic system, so chronic infectious diseases, f. i. tuberculosis and syphilis attack the lymphatic vessels and glands; it is not here however the attacked organ which is the main consideration, but the nature of the disease.

Detailed information on these two diseases, as well as on scrofula, will be found in other portions of this work.

Of the chronic diseases of the lymphatic vessels, we have to consider in connection with our subject their dilatation only. More so than in the veins, various degrees of dilatation occur in the lymphatic vessels. We meet slight and harmless cases of lymphectasis up to enormous lymph-varices, insignificant local lymphangiomata up to pronounced elephantiasis lymph-angiec-

todes. Considering the rarity of the disease it is not possible to lay down general rules.

A transition to the diseases of the blood is formed by the progressive hyperplasia of the lymphatic glands, of which we distinguish two types, both of which have a malignant progressive character as a common feature. One type is represented by a leukæmic adenia, *i. e.*, malignant lymphoma with changes in the blood such as are characteristic of leukæmia, and the second type by *Hodgkin's* disease or lymphatic pseudo-leukæmia, *i. e.*, a progressive hyperplasia of the lymphatic glands of a malignant nature which leads to a fatal issue through cachexia and advancing anæmia, there being no leukæmic changes in the blood in the latter form. As regards seriousness, they both occupy a place midway between the malignant tumours and the pernicious diseases of the blood.

From our point of view we have to consider a possible complication of these diseases with pregnancy. We have no right to take up an absolutely pessimistic attitude, that is, to allow the pregnancy to take its course on account of the probable hopelessness of the illness; we know that pregnancy as such predisposes to progressive pernicious diseases of the blood, and an immediate interruption of the gestation appears therefore to be indicated if the loss of strength has not gone too far.

The primary sarcomata of the lymphatic glands belong, if it is not too late, to the sphere of the surgeon.

The secondary tumours of the lymphatic glands offer such an unfavourable prognosis that the physician will probably abstain from all interference.

XI

Diseases of the Respiratory Organs in Relation to Marriage

XI

DISEASES OF THE RESPIRATORY ORGANS IN RELATION TO MARRIAGE

By **S. Kaminer, M.D.** (Berlin)

It has already been pointed out in the Introduction to this work by *Senator* that it is hardly ever acute diseases but principally if not exclusively chronic conditions which come into question with regard to the contraction of marriage and the happiness of married life. This limitation applies particularly to the acute diseases of the respiratory organs, with respect to which nothing special can be said from the point of view of their relationship to intended or accomplished marriages.

I. Pulmonary and laryngeal tuberculosis.—

Among the chronic diseases of the respiratory organs tuberculosis of the lungs and larynx occupies a very prominent position in this respect because it is not only the disease of the individual as such with which we are concerned. It is also as a CAUSE of disease "that tuberculosis has great pathological importance," inasmuch as it is owing to its infectiousness a source of danger to the person living in the connubial state with the sufferer, as well as to their offspring who frequently inherit it.

It is necessary to point out at once that pulmonary phthisis and pulmonary tuberculosis are two separate conceptions though they are erroneously often taken as being identical. *Virchow* has always insisted that there should be a strict distinction between them, though not in the sense of *Niemeyer* and his school who regarded phthisis as a physical dyscrasy and forerunner of pulmonary tuberculosis. But the pathological-anatomical picture and the clinical course of the disease have recently been forced too much into the background by the

tubercle bacillus, the causative agent present in the tissues in every stage, not only with regard to nomenclature but also for purposes of prognosis. To-day it is only to that symbiosis of the tubercle bacillus with other pathogenic bacteria, which is of such decisive importance to the course and issue of the disease, that the name of consumption or phthisis is given.

The distinctiveness of the two notions Tuberculosis and Phthisis is in so far of importance with regard to the question of the contraction of marriage that whereas consumptives, being incurable invalids, ought never to be allowed to marry, this permission cannot be withheld from tuberculous persons in every instance as a matter of course. For the opinion as to the marriageableness of tuberculous individuals must depend entirely upon the prognosis of the disease in general. Those who regard every tuberculous affection of the lungs as absolutely incurable will of course be opposed to it, and the extreme result of this view is to be seen in the law of the State of Indiana which prohibits the marriage of all tuberculous persons. But those who believe in the curability of tuberculosis and are satisfied that the same causative agent may give rise to one and the same disease but one which is variable in length, course and issue will not in every case be able to give the same brief answer to the question whether and when tuberculous individuals may marry.

The success of modern therapeutics has resulted in an almost general rejection of the view that tuberculosis is an incurable disease. This success is not due to any specific remedy such as creosote, cinnamic acid or tuberculin for each of which great merit is still claimed, but is mostly a consequence of the circumstance that owing to the more delicate diagnostic aids at our disposal we are in a position to recognise the disease at such early stages that its course can as a rule be influenced most beneficially by climatic treatment or physical dietetic measures. Unfortunately however this favourable result cannot in spite of early diagnosis be looked for in every case and though we know it is possible for a tuberculous lung to heal up, it is just as difficult as it was formerly to foretell at all the course of commencing cases.

The investigations recently resumed by *Naegeli*¹ on tuberculous changes in the human cadaver have led to such interesting results that, as *Adolph Schmidt*² expresses himself, a new factor has been thrown into the discussion on tuberculosis. *Naegeli* has proved by the large post-mortem material of the pathological institute of Zurich that tuberculosis is rare but mostly fatal in the first years of childhood and more frequent but not necessarily fatal in somewhat older children. Of the bodies of persons between 14 and 18 years old dissected by him one half had already been attacked by tuberculosis and in all these cases the process had been active and progressive not a single one showing signs of healing. Between the 18th and 30th year almost every dissected body showed tuberculous changes; of these 75% were active and 25% healed up. From the 30th year onward the probability that active and fatal tuberculosis will be found diminishes while the certainty to find tuberculous lesions at all remains absolute; as age advances the number of active and fatal cases of tuberculosis diminishes while the number of benign recoveries increases.

These striking conclusions of *Naegeli*, though their objective justification may require examining into and though they may apply to the proletariat only, must needs have some influence upon the estimate of tuberculosis as an impediment to marriage. They show that it is for purposes of diagnosis of the utmost importance to establish in every given case whether we have before us a fresh and active process or one that has run its course. As long as the microscopic evidence of the presence of tubercle bacilli in the sputum was looked upon as the only decisive criterion of an existing pulmonary tuberculosis the disappearance of these bacilli was necessarily overestimated as a sign of recovery though *v. Leyden*³ had already in 1884 warned us against such a fallacy. But to-day we know with certainty that the tubercle bacilli may disappear from the sputum and again make their appearance without there being in these occurrences any positive evidence to justify us in arriving at a

¹*Virchow's Archiv.* Vol. 160.

²*Deutsche Med. Wochenschrift*, 1903. No. 40.

³*Zeitschr. für klin. Medizin.* Vol. 8.

definite prognosis. The presence of tubercle bacilli in the sputum is consequently no more the only decisive sign in prognosis than it is in diagnosis though it is in both a very valuable aid. This difficulty in making both a diagnosis and a prognosis has not been entirely removed even by *Koch's* second important discovery namely that of Tuberculin. *Koch* had hoped that by the use of this preparation we should be able to diagnose doubtful cases of "phthisis" in which a definite opinion cannot be formed as to the nature of the disease by a microscopic examination of the sputum for bacilli and elastic fibres or by the aid of physical signs. Experiments on animals have in most cases confirmed *Koch's* opinion, but this does not justify us in drawing the same conclusions with regard to man. The variability of the organism in the latter is so enormous that pathological knowledge obtained by experiments on animals must often fail when applied to human beings.¹ Moreover the statistics of *Beck*² quoted chiefly in support of *Koch's* view are capable of being interpreted in a sense diametrically opposed to it. Three cases of leprosy reacted to tuberculin with distinct general symptoms; of 16 cardiac cases 10 reacted; of 31 cases of muscular rheumatism 23 reacted; of 17 cases of acute nephritis 4 reacted; of 106 cases of gonorrhœa 59 reacted; of 145 cases of syphilis 59 reacted, etc. *Beck* concludes from these figures that tuberculin is the keenest diagnostic instrument for the recognition of tuberculosis. He says: "We are justified when a person reacts to tuberculin in inferring the presence of a tuberculous focus, whether it be one, if ever so minute, in a bronchial gland, or a small tubercle in the lung or any other organ which cannot be detected by a physical examination." But he does not give any pathological-anatomical proofs in favour of this conclusion which is so important in its consequences. He takes for granted what in reality requires first to be proved, and so this very work of *Beck* lends confirmation to the opinion probably expressed first by *Rosenbach*³ that non-tuberculous individuals

¹*Martins*, Pathogenese inner. Krankh.

²Deut. Med. Woch. 1899, No. 9.

³Arzt contra Bakteriologie. Berlin-Vienna. Urban & Schwarzenberg. 1902.

also react to tuberculin.¹ This sceptical attitude is possibly strengthened by the fact, proved beyond doubt, that not even all individuals, in whom tuberculosis is known with certainty to exist, react to tuberculin. Another conclusion of *Koch's*, that it would be possible by the reaction to tuberculin to demonstrate in apparently recovered cases of tuberculosis of the lungs or of the joints whether the healing process is fully accomplished or whether there are any isolated foci left behind from which the disease might at any subsequent time spread again like a fire from cinders glimmering among the ashes—this conclusion is so far also not yet shown to be correct though it could easily have been proved by the joint researches of a Zurich clinician along with the Zurich pathologist *Naegeli*.

The tubercle bacillus being therefore no longer, and rightly so, the prime and ultimate argument in diagnosis, and since the tuberculin reaction is also unreliable in settling the question of complete recovery, the physical examination of the lungs has again assumed that importance which seemed at one time to be denied to it. For though the causative agent may be the same in all cases we must not lose sight of the variability of the pathological changes to which it may give rise and the different ways in which the disease runs its course. These different physically demonstrable pathological changes though they are only stages along the route which the disease is travelling follow one another in most regular succession. It is consequently necessary in spite of the importance attached to bacteriological and physical examination in diagnosis as well as in prognosis to take into consideration the clinical picture, the subjective symptoms and the state of the constitution. The correct summation of all these factors is of the greatest consequence when considering the question of marriage in connection with tuberculous individuals.

The not very numerous authors who have dealt scientifically

Translator's note: Is not the reaction of non-tuberculous (?) individuals to tuberculin, taken in conjunction with *Naegeli's* statistics, rather a confirmation of the opinion that we are *all* more or less tuberculous? I have often heard *Gerhardt* say: "So ein bisschen tuberculös sind wir alle!" (Just a bit tuberculous we all are!)

with the question of the marriageableness of tuberculous persons have naturally come to different conclusions corresponding to their views of the disease. *Hartsen*¹ has recommended marriage and pregnancy as invaluable natural remedies in influencing phthisical processes—phthisical in the sense of the oldest nomenclature; *Virchow*² on the other hand, based upon his sad experiences, has strongly protested against any such marriages. He had frequently noticed in abstemious tuberculous persons after their marriage a development of acute processes among other organs in the prostate and he had particularly often had occasion in the post-mortem room to satisfy himself of the severe aggravation of the disease caused by the puerperal state.

According to *Virchow* there is nothing more common than for young people to fall a prey to galloping tuberculosis during the first years of their married life and his advice to medical practitioners is therefore that when consulted by such patients they should unhesitatingly and without any sentimentality explain to them the position and the danger they are incurring by marriage and let them decide for themselves. Of the same opinion is *van Ysendyk*,³ and *Kirchner*⁴ demands that everyone who has the power should prevent tuberculous individuals from marrying. *Gerhardt*⁵ also was in principle opposed to the marriage of tuberculous persons though he was not in favour of enforcing the restriction by Draconian laws. He did not forget the psychological influence which this prohibition might exercise upon them, but without under-estimating it he considered the psychical disappointment of far less importance than the dangers of tuberculosis. The only concession he would grant was to request a year's delay before deciding definitely and this only in such cases where the circumstances made it impossible to prohibit the marriage altogether.

¹*Virchow's Archiv.* Vol. 49.

²*Ibid.*

³*van Ysendyk*, Bulletin de l'académie de médecine de Belgique 1898.

⁴*Kirchner*, Bericht über den internationalen Kongress zur Bekämpfung der Tuberkulose. 1899.

⁵*Gerhardt*, Zeitschrift für Tuberkulose und Heilstättenwesen 1891.

*Von Leyden*¹ and *Fürbringer*² are not so pessimistic with regard to the influence of marriage upon the course of the disease and not so strict in giving their consent. Both have seen good results from marriage and frequently as it happened in the very cases which they expected would take an unfavourable turn. Though they acknowledge the dangers of marriage they lay great stress on the variability of the course of tuberculosis and try to make it clear to the medical profession that it is their duty just as often to forbid marriage as to permit it. For marriage is from the hygienic point of view the most desirable union of the sexes, but it and its consequences demand such increased activity on the part of the organism of both husband and wife that it is not always possible for a person afflicted with tuberculosis to satisfy these demands for any length of time.

Influence of marriage on the tuberculosis of the husband.—The demand of some hygienists that a man should never indulge in sexual intercourse before marriage, a demand as to the physiological justification of which opinions are very much divided, will probably remain for ever a pious wish. The fact remains that the exercise of sexual connection before marriage on the part of the man is not by any means a rare occurrence and society is not prepared to condemn the practice. It must therefore be admitted that it is an exception for a man to remain chaste until his marriage. The sexual act as such is generally no novelty to the newly married husband and the physiological and pathological consequences of the same to a tuberculous individual hardly ever become a subject for consideration. Nevertheless it must not be overlooked that non-connubial and connubial intercourse have very different effects upon the organism. Non-connubial intercourse does not fatigue so much by its frequency, for it is only in very rare cases that consumptives cohabit with women, as by the circumstances accompanying it such as sleepless nights spent in public places of amusement, increased sexual excitement as a conse-

¹*v. Leyden*, Diskussion zu *Gerhardt* Zeitschr. für Tuberkulose u. Heilstättenwesen, 1891.

²*Fürbringer*, Diskussion zu *Gerhardt*, Zeitschr. für Tuberkulose u. Heilstättenwesen, 1891.

quence of different stimulants and over-indulgence in alcohol. *Jacob* and *Pannwitz*¹ quote as concrete instances cases where tuberculous individuals having had sexual intercourse with prostitutes leave the house immediately afterwards either to return to their work or to go home in a cold winter-night thus exposing themselves to the inclemency of the weather. If we also bear in mind that tuberculosis is very frequently accompanied by an almost characteristic morbid increase of the sexual desire we shall not easily underrate the ill-effects of non-connubial intercourse on the health of tuberculous individuals. *Darembert*² and *Wolff*³ think that we are for these reasons justified in advising "cured" tuberculous patients to marry. And indeed they are quite right. Because from the standpoint of sexual hygiene marriage is to be regarded as a blessing to the individual: the sexual life assumes an even course; regularity takes the place of promiscuousness; sleep is not curtailed—conditions are created by married life for the exercise of sexual intercourse which are hygienically of the highest value to the tuberculous husband.

The question presents however from the sociological point of view many serious disadvantages particularly as regards the proletariat. The struggle for existence is by marriage rendered more severe. Though *Jacob* and *Pannwitz* maintain that a careful working-man's wife can for half the amount of money required by an unmarried man for his keep, provide nourishment more suitable for an invalid than he may obtain at the public places which he frequents, it must be admitted that this calculation does not apply in all cases. We must bear in mind that the income of the working-man does not increase by his marriage but that on the contrary fresh and considerable burdens are added to his previous expenses chiefly by the procreation of families which are notoriously among the working classes as a rule rather numerous.

It is a well-known fact that tuberculous working-men generally bring into the world a number of children which is out

¹*Jacob* und *Pannwitz*, Entstehung u. Bekämpfung der Lungentuberkulose. Leipzig 1902.

²*Darembert*, Notes sur le mariage des tuberculeux. 1890.

³*Felix Wolff*, Behandlung der Lungenschwindsucht. Wiesbaden 1894.

of proportion to their income. *Reibmayr*¹ in his remarkable book has attempted to explain this phenomenon by the tendency of nature to compensate for the shortcomings of procreation as regards quality by a corresponding increase in quantity so that where the progeny is likely to be in danger through inheriting some disease its number may be relatively greater. However that may be, we have the fact to reckon with as is also proved clearly by the statistics of *Riffel*.² With the increase in the size of the household grows also the quantity of the necessities required and consequently the labour of the bread-winner, a labour which his weakened organism cannot perform at all or only with great difficulty. Want and poverty soon make their appearance, and nutrition, the most important factor in the treatment of tuberculous processes, suffers both in quantity and quality. Through the numerical increase of the family the housing conditions also undergo a change for the worse, and thus circumstances are created as a consequence of marriage by the unfavourable social state of the proletariat which are inimical to the recovery of tuberculous processes.

It is for these reasons that the marriage of a tuberculous proletarian implies from a social point of view the deterioration rather than an improvement of his economic position.

The struggle for existence claims also among the upper classes a proportionate number of victims though compared to the proletariat they form the exception rather than the rule. It is considerations of a social nature that play here a more important part. Marriage may for instance be highly dangerous to the tuberculous husband whom a passionate and vivacious wife is constantly dragging to parties and balls, to concerts or the theatre. What is to her a pleasure is to him a burden and therefore an enervation of his organism, a diminution of his resistibility.

Where there is no indigence or want of proper housing accommodation in the case of the proletarian, where the well-to-do are able and willing to renounce the pleasures and obliga-

¹*Reibmayr*, Die Ehe Tuberkulöser u. ihre Folgen. Leipzig 1894.

²*Riffel*, Mitteilungen über die Erbllichkeit und Infektiosität der Schwindsucht. Braunschweig 1892.

tions compatible perhaps with their social position but not with their bodily constitution, marriage may be regarded as of the highest hygienic value to the tuberculous husband and as a very important remedy in its effects upon the diseased condition as such; otherwise it is only too frequently the cause of rapid aggravations.

Influence of marriage on the tuberculosis of the wife.—As a consequence of the modern organisation of society, the part which woman takes in the struggle for existence is becoming greater from day to day. The results of this struggle are more disagreeably apparent in the case of married women since the organism of the latter is already sufficiently taxed by the physiological processes of pregnancy and child-birth. *Von Leyden* particularly asks us to remember that though pregnancy is a physiological condition it is one closely bordering on the pathologic. For this reason conception in the case of an ailing woman is always to be regarded as a more or less serious complication.

And yet as late as in the middle of the last century the views on the influence of pregnancy upon the tuberculous process were diametrically opposed to those of the present day. The prevalent opinion was that this influence is a particularly favourable one. The history of this opinion is like that of many others in medical science; nobody knew how it originated, proofs of its correctness were unobtainable but as it had been circulated especially in France by the bearers of such weighty names as *Bordeau*, *Collen*, *Baumès*, *Portal*, *J. Frank*, etc. it became the common property of the medical profession and exercised great influence upon its decisions. Marriage—"ce remède banal de familles"—was recognised by scientific medicine as a cure of the tuberculosis of young girls. It is interesting to note that *Andral*,¹ the first physician who made a different observation described it as a rare occurrence deviating from the general rule. Subsequently *Grisolle*,² *Dubreuil*³ and others have by numerous observations endeavoured to destroy the legend of

¹Quoted by *Leudet*.

²*Grisolle*, De l'influence que la grossesse et la phthisie exercent l'une sur l'autre. Arch. général. 1850. Tome 22.

³*Dubreuil*, Bulletin de l'académie de médecine de Paris. Tome XVII.

the favourable influence of pregnancy upon tuberculosis. Quite recently the study of this important question has again been undertaken with great earnestness. *Weber, Gerhardt, v. Leyden, van Ysendyk*, and others have often had occasion to record sad experiences. The writer¹ also has in a report of 50 cases of the third medical clinic (*Senator*) and of the Berlin Royal University polyclinic for diseases of the lungs (*N. Wolff*) established in 33 cases an aggravation of the tuberculosis through pregnancy and only 8 cases in which pregnancy did not exercise any influence upon the course of the disease.

The important part which pregnancy plays in the causation and aggravation of pulmonary tuberculosis is also clearly shown by the collective investigation of *Jacob* and *Pannwitz* made by them at German sanatoria for consumptives. *Kuttner*,² *Loehnberg*,³ *A. Fränkel*,⁴ *Hamburger*,⁵ *Czempin*,⁶ *Strassmann*,⁷ etc. have published interesting observations, the two first-named authors especially with regard to the deleterious influence of pregnancy on tuberculosis of the larynx. All these observations and many others establish with certainty the correctness of the assertion that in a very large number of cases pregnancy has an unfavourable influence upon the course of tuberculosis and that it is also very often the cause of its origin or of the recrudescence of old deposits. The high percentage of aggravations (in the writer's statistics 66%) is explained by the nature of the complication; morning sickness and loss of appetite which cause great discomfort to even healthy pregnant women must naturally have a severer effect upon tuberculous individuals, because nutrition which is so important an item to them is bound to suffer through these gastric troubles, troubles that are difficult to remove even under ordinary circumstances. Vomiting generally accompanies these symptoms and its effect is not only an impairment of nutrition but it frequently pro-

¹*Kaminer*, Dt. Med. Wochenschr. 1901. Nr. 30.

²*Kuttner*, Arch. f. Laryng. Bd. 12.

³*Löhnberg*, Münch. Med. Wochenschr. 1903.

⁴*A. Fränkel*, Vehr. d. Vereins f. innere Medizin 1901.

⁵*Hamburger*, Berl klin. Wochenschr. 1902.

⁶*Czempin*, Vehr. d. Berl. Med. Gesellschaft 1902.

⁷*Strassmann*, Verh. d. Vereins f. innere Med. 1902.

duces hæmoptysis on account of the convulsive and suffocative movements with which it is associated. Moreover, by the forcing upwards of the diaphragm, by the diminution in lung volume (retraction), by the deficient respiratory capacity and by the development of the placenta, conditions are created which have a disturbing effect upon the circulation in the lungs and the activity of the right side of the heart. This is the more important as even at the present day it is not possible entirely to deny that there are certain relations between the circulation of the blood in the lungs and tuberculous processes to which they may be subject. In the cases observed by the writer it appeared that the subjective and possibly also the objective symptoms were more marked in the first months of pregnancy than in the last, which is not probable in view of the normal course of pregnancy in a healthy woman. The patient accommodates herself so to speak gradually to her altered condition; she loses if she is in the first or even second stage of her illness many of her most distressing symptoms and both percussion and auscultation of the lungs do not reveal any progress of the disease. The condition seems to become a latent one, the patients do not appear to suffer very severely—until labour occurs.

Though the reseaches of *Wintrich*, *Kuechenmeister* and *Dohrn*¹ have proved to satisfaction that the vital capacity of the lungs is not diminished during pregnancy and that the thorax is not made smaller by the pregnant uterus it has nevertheless been pointed out by *v. Leyden*² when discussing the complications of pregnancy by chronic diseases of the heart that the extent of the healthy organism is encroached upon in the pregnant woman by the development of the embryo. "After childbirth the conditions become again different, the resistance to respiration grows less, the breathing gets stronger and the possibility is by no means excluded that respiratory disturbances and congestion of the lungs will thus be caused which may become pronounced only gradually that is in the first days of the puerperium."

¹*Dohrn*, Monatsschrift f. Geburtskunde Bd. 24.

²*v. Leyden*, Zeitschrift f. klinische Med. Bd. 23.

Of 23 tuberculous women observed by the writer 14 died from causes connected with childbirth, 7 of them in the first few days after labour. What *Gusserow*¹ emphasised with regard to pregnant women suffering from heart disease took place here also: they were suddenly called upon to perform a laborious task to which their organism weakened by tuberculosis and pregnancy was no longer equal. A great number of cases communicated by *van Ysendyk*, *Jacob* and *Pannwitz*, *Maragliano*,² *Hamburger* and others ran a similar course. According to *A. Fraenkel* the rapid progress of tuberculosis after childbirth is due generally to a so-called aspiration-tuberculosis as defined by *Hanau*; from more or less extensive deposits in a state of disintegration a quantity of secretion is during the act of labour suddenly aspirated into the bronchi, thus giving rise to a galloping tuberculosis spread in lobular deposits all over the lungs. Of course not all cases run the same course; different observations have also been recorded. The writer has seen a fairly large number of cases of tuberculous women who have stood the ordeals of childbirth very well and retained their ability to work. Social conditions certainly have *some* influence on childbirth, but the difference between its consequences in a proletarian woman and those in one who is socially her superior is not generally so marked as to justify *Hamburger's* inference that special therapeutic laws are necessary for the former class. Tuberculous working-women also can at times withstand childbirth, but it is never possible to foretell this happy issue with anything like certainty. Conception is always in every tuberculous woman a serious danger to health and life, and the development or expulsion of the fœtus is very frequently in apparently recovered cases of tuberculosis the cause of acute recrudescences of a hitherto latent disease.

Equally fatal opinions similar to those on the influence of pregnancy and childbirth on tuberculous patients were prevalent at the beginning of the last century on the subject of

¹*Gusserow*, Verh. d. Charité-Aerzte 1899.

²*Maragliano*, Bericht über den intern. Kongress z. Bekämpf. d. Tuberkulose 1899.

lactation. *Ellinger* distinctly recommended prolonged lactation as a prophylactic against tuberculosis. *Grisolle* was again the first to demonstrate that lactation by tuberculous women may have just as serious consequences for themselves as for their sucklings. Though most of them secrete milk copiously the act of suckling fatigues them considerably and the secretion diminishes perceptibly in a few weeks or ceases altogether. The writer saw not long since a case where a hitherto perfectly healthy woman developed severe tuberculosis during lactation. *Gerhardt* and also *Jacob* and *Pannwitz* forbid such suckling not only in the interest of the mothers but also in that of their children. *Grisolle* has noticed that the milk of tuberculous women frequently causes profuse diarrhœa from the effects of which the infants quickly die if their food is not immediately changed. Post-mortem evidence of tuberculous changes is in such cases unobtainable, and this is in so far important as it has been asserted by some that tuberculosis is easily transmissible from mother to child through the medium of the milk. This theory has as little foundation as the opinion that the milk of tuberculous women is as a rule injurious to the digestion of the suckling, because researches have so far failed to demonstrate a constant alteration in the composition of the milk of tuberculous women.

The secretion of milk is according to *Munk* the most exacting performance of the female organism. The demands made on the economy of the latter are naturally much increased by lactation. The tuberculous organism suffers by it more than the normal. The assimilation of food is diminished, the body-weight decreases and a general condition is created by the act of lactation which favours considerably a rapid development of tuberculous processes.

In estimating the influence of marriage and of its consequences upon tuberculosis little importance has been attached to the stage of the disease and to its clinical form because the injurious influence is generally though not always the same. In the various stages of the illness the consequences of that influence are accordingly different. A tuberculous woman in the third stage of the disease is more liable to die in childbirth than

one in the first whose condition will probably only become worse, or than one apparently cured in whom latent foci may break out afresh and cause a recrudescence of the symptoms.

Tuberculosis as a cause of disease in married life.—In considering tuberculosis as a cause of disease in the married state unequally great importance must be attached to the different forms and different stages of the disease, because though tuberculosis is not necessarily always infectious certain phases of it present a greater or less possibility of infection. This fact is clearly established not only by experiment but also by clinical experience.

The doctrine of the contagiousness of tuberculosis is not as *Cornet*¹ says the daughter of bacteriology but its mother; only because of the conviction that tuberculosis is contagious has the agent of the infection been sought for again and again until it was found in the tubercle bacillus. That conviction however was not by any means universal, and if there were in every century physicians of great fame from *Galen* down to *Lazare Rivière*, from *Schenck von Grafenberg* down to *Peter Frank* and *Weber* whom experience had taught that tuberculosis is transferable from man to man by contagion they were both in number and in the extent of their observation far behind their opponents. It is however of interest in connection with this historical retrospect to learn that all the time during which tuberculosis was regarded as a constitutional anomaly, by far the largest number of exceptions in which the disease was attributed to transmission were thought to be due to heredity in married life. So according to the standpoint which the observers took with regard to these facts—whether they looked upon them as scientific curiosities or whether they saw in them an eternal source of serious danger to the community—they called attention more or less emphatically to the importance of marriage as a disseminator of tuberculosis. They demonstrated numerous cases of tuberculous husbands who had infected several wives in succession, and others in which husband or wife who suffered from a protracted and fairly latent tuberculosis had by contagion produced in his or her partner a far more

¹*Cornet*, Die Tuberkulose. Vienna 1903.

serious and rapidly fatal form of the disease. It is certain that in former centuries industrial activity with its accompanying hygienic harms was not as widespread as it is in modern times and that the importance of married life as a generator of disease was therefore relatively higher than it is at the present day. It must also be remembered that in a large number of the quoted cases the tuberculosis of husband or wife was probably not the only cause of disease in the other partner and that the same noxious circumstances might have produced very frequently the same disease in both of them though perhaps not at the same time on account of their unequal resistibility. Nevertheless it should under all circumstances be taken into consideration that since tuberculosis is according to established theories a disease which is infectious at times the possibility of infection cannot be favoured by anything so much as by married life.

Very frequent attempts have been made to establish from statistics the seriousness of the risk of infection run by either husband or wife where the other partner is a tuberculous subject; but the results and percentages obtained have never been the same. The German collective investigation shows out of 41 cases in which contagiousness was proved 23 cases of infection between husband and wife and *vice-versa*; the proportion in the American inquiry is 158 out of 262, in the French 107 out of 213. But the importance of these figures is diminished by the fallacy already mentioned namely that they do not prove without a doubt that the only cause of the illness lay in the fact that the sufferers were married persons. For this reason it is not possible by these figures to define the amount of danger and the significance of tuberculosis as a national disease; they only tend to confirm the fact. *Jacob* and *Pannwitz* in their investigation have dealt with this objection and their results constitute therefore more valuable material. In 58 cases in which the wife was tuberculous before the husband contracted the disease only 10 showed no other cause than infection; and out of 69 cases in which the husband was tuberculous before the wife became so 42 gave the same result. It does not however appear to me that these figures justify the conclusion

arrived at by the authors that women exhibit a greater predisposition to become infected from their tuberculous husbands, although a theoretical reason for this surely remarkable inference is discernible in the physiological burdens of woman (but not in the ways in which the causative agent is known to produce infection). It must also be admitted that women generally stay more at home and are thus for a longer time exposed to the influence of the sputum which their husbands especially among the working classes are in the habit of expectorating without any regard to hygienic precautions. This is perhaps the cause of the disproportion in the percentage.

Infection through sexual intercourse.—Opinion with regard to the behaviour of the exciting agent of tuberculosis and consequently also with regard to the mode of conveyance of the disease by the contagium vivum has since the discovery of the latter and also as a result of experiments on animals been very much divided. *Jani*¹ has reported in an article which he did not live to see printed and which was consequently published by *Weigert* that he had been able to demonstrate tubercle bacilli in the testicles and prostates of men who had died from tuberculosis while he could not detect either in the neighbourhood of the bacilli or anywhere else the slightest traces of pathological tissue-change. These results could not be appreciated highly enough if they had only been confirmed. But the control-researches instituted at the instigation of *Birch-Hirschfeld* and *Ziegler* by *Walter*² and *Westermayer*³ have shown that the presence of tubercle bacilli in healthy genital organs is an extraordinarily rare event if not an impossibility. Judging from what we know to-day the probability is that the bacilli stained by *Jani* were some other kind of acid-fast bacteria, especially as he did not support his conclusions by experiments on animals.

We are therefore bound to recognise that the transmission of tuberculosis through the medium of the seminal fluid or the sexual act respectively must be excluded from the list of possi-

¹*Jani*, Virch. Arch. Vol. 103.

²*Walter*, Ziegler Beiträge. Vol. XVI.

³*Westermayer*, Diss. Erlangen 1892.

bilities as long as the genital organs are healthy. Such transmission, however, is quite within the range of possibility when these organs are diseased and both experience and experiments have proved this to be true. The well-known experiments of *Gaertner* and *Cornet* have shown that it is possible to infect a female guinea-pig by letting it cohabit with a buck whose genital organs are tuberculous, and clinical observations for instance those of *Schuchart* have shown that a similar mode of infection occurs occasionally in human beings. *Posner*¹ has recently with the help of *Virchow's* post-mortem material endeavoured to find out whether secondary tuberculosis of the genital organs is frequent or rare. He says himself that the results ought perhaps to be multiplied because the reports are naturally defective in the particulars referred to.

It must also be admitted that observations of tuberculous changes in the cadaver frequently lead to far different results when they are carried out with one particular object in view. (*Naegeli*.) Testicles and prostate are not usually examined for tuberculosis in ordinary post-mortem dissections unless there are special clinical indications. This fallacy must be taken into consideration when mention is made of the relatively small number of cases of secondary uro-genital tuberculosis. On the other hand *Kirchner* points out how insignificant the number of these cases is altogether when compared with the enormous amount of post-mortem work performed in the course of a year. And if other statistics for instance those of *Schmorl*, *Rosenstein*, *Thorn*, etc., show a somewhat greater frequency we must not forget that many of these metastases make their appearance when the patients are already in extremis.

On the whole it is fairly certain that secondary tuberculosis of the male genital organs is relatively rare but that whenever it is present in a husband there is a possibility of the wife becoming infected. It is consequently, as *Posner* rightly says, of importance to the practitioner when asked to give his consent to a marriage that he should not overlook the possibility of a tuberculous affection of the genital organs.

Secondary tuberculous changes in the female genital organs

¹*Posner*, Zeitschr. für Tuberkulose und Heilstättenwesen Bd. II.

are even rarer than in the male; when they are present the same or corresponding inferences are applicable.

Infection through the medium of the sputum.—The possibility of infection through the medium of the sputum or of the fæces when they contain tubercle bacilli plays in married life a far more important part than that of infection through sexual intercourse. *Cornet* has refuted the view of the ubiquity of the tubercle bacillus by ingenious experiments and he as well as *Tappeiner*, *Stohl*, *Galtier*, *Schiel*, *Fischer* and others have demonstrated that dust containing tubercle bacilli in a dry but nevertheless viable state is a constant source of danger to individuals who are predisposed to tuberculosis. It is the merit of *Fluegge* and of his pupils to have pointed out the danger of infection through droplets. Though the harmlessness of the air expired by tuberculous patients has been proved by numerous investigations the possibility of the transmission of tuberculosis from mouth to mouth—for instance through kissing—cannot be denied. A portion of the tubercle bacilli coughed up from the lungs may lodge in the mouth so that intimate contact with the patient is never without its dangers. Constant cohabitation extending over many years in the same house, the occupation of the same bedroom, the intimate bodily contact, the use of the same utensils, the gradually diminishing prophylaxis—if it ever was much in evidence—as a consequence of being too familiar with it, all these circumstances make it almost impossible for the healthy husband or wife to avoid infection.

If the tubercle bacillus were the only factor in the causation of tuberculosis the reciprocal infection of husband and wife would not be only very frequent but universal. But though the individuals concerned may be provided by nature with a certain immunity against tuberculosis, it is well known that this immunity can easily change into a condition of an opposite character by intercurrent diseases such as pneumonia, influenza, syphilis, by repeated pregnancies, or by unfavourable social circumstances. While the tuberculosis is a latent one and while there is either no expectoration at all or none containing any bacilli there is of course no danger of infection through this source.

It is however worth remembering that in many tuberculous patients especially in those suffering from the more fibrous forms a discharge of tubercle bacilli takes place periodically so that in spite of very careful examination of the sputum none are detected for a very considerable time until an intercurrent affection, possibly an attack of influenza, causes them to make their appearance or reappearance. A negative result in an examination for tubercle bacilli is therefore some guarantee for the present but not for the future. In any case as long and as often as a tuberculous husband or wife expectorates sputum containing tubercle bacilli he or she is a constant danger to the other partner. For the consideration of the prevalence of tuberculosis as a national disease, conjugal life with an infected individual is therefore even at the present day one of the chief factors.

The offspring.—The incontestable fact that tuberculosis occurs very often successively in different generations of the same family is accountable for the former conception of the disease as a constitutional anomaly. Though as *Virchow* says the doctrine of heredity has received at the hands of medical science most careful and prolonged study there was no hesitation in regarding as purely hereditary even the interrupted appearance of tuberculosis. But when the exciting cause of the disease was discovered in the tubercle bacillus some of the contagionists went to the other extreme of declaring every repetition of tuberculosis in the offspring as due to nothing but infection from their parents with whom they are living under one roof.

According to our present views it cannot be denied that infection does play an important part in the propagation of tuberculosis among the offspring of the tuberculous. The same factors which contribute to the transmission of the disease from spouse to spouse also contribute to its transmission from parent to child, though not perhaps to the same extent. This applies not only to the large number of cases where the disease occurs already in the next following generation but also, though of course not so often, where several generations happen to live together, to those cases where the

succession has been interrupted. It is well known that children are subject to very many diseases of a predisposing character; the injurious influences are frequently, though not as a rule, the same in the parents as in the children; it is therefore comprehensible that the transmission of the parental tuberculosis to the offspring by the infection of individuals predisposed to it occurs perhaps just as frequently as the transmission from husband to wife or vice-versa.

But the theory of infection does not answer in all cases sufficiently, especially in those where the tuberculosis makes its appearance not during childhood and while the parents are ill, but later in life; and also where tuberculosis becomes manifest in the descendants of tuberculous procreators who have been dead for years or possibly decades.

The attempts to explain these cases by the hereditary transmission of the infective germ i. e., by germinal or placental conveyance of the tubercle bacillus¹ have received but scanty support from the experiments of *Wolff*, *Gaertner*, *Sanchez-Toledo*, etc. and from the observations of numerous pathologists. It is true that a few cases of transmission of maternal tuberculosis have been observed and described in both human and animal fœtuses but their number is so small that it is hardly possible to attach to them any general or practical importance. We must consequently conclude that it is not the bacillus which passes into the offspring but certain bodily peculiarities which favour the development of tuberculosis in subsequent years, in a word, what we call "predisposition." (*Koch*.)

*See*² has remarked with regard to this "predisposition" that the word has only been invented to hide our ignorance, and *Cohnheim* also has added to it the epithet "mystical" because all the attempts to give to this idea of certain bodily peculiarities a firm basis must really be described as failures. For all that, the existence of what we call "predisposition" cannot be doubted even if we are not always in a position to explain its nature or to explain it every time in a like manner. Some believe that it is the so-called phthisical habit or tendency which

¹Compare with *Orth's* article, pp. 39-45.

²De la phthisie bacillaire des poudrons. Paris 1884.

is inherited, others see in the congenital smallness of the heart the reason why so many descendants of the same family become tuberculous, and quite recently stress has again been laid upon certain articular anomalies in the thorax as being of great importance in the genesis of pulmonary tuberculosis. (*Freund.*)¹ These different opinions are to be accounted for by the circumstance that "predisposition" and "immunity" do not in a mathematical sense represent fixed sums but variable quantities for which we may substitute any value we like, from zero to the unlimited. The predisposition may be local for one particular organ or general for the whole organism, it may last during the whole life of an individual or only during certain stages of the same, it may at times be increased and at others diminished. According to *Gottstein's* definition we therefore understand by predisposition towards a certain contagion that variable quantity which represents the reciprocal relation between the constitutional strength of man and the exciting capacity of a certain bacterium.

If we acknowledge the correctness of this definition of predisposition it is comprehensible that the bodily peculiarities necessary for the commencement of tuberculosis may be either acquired or inherited, but that they are more frequently acquired. Opinion can only be divided on the point whether definite rules can be laid down with regard to the hereditary transmission of predisposition.

The enormous number of existing statistics are of no precise value in the elucidation of these questions, because while the great majority of them, as it can only be expected, disclose with certainty how many times tuberculosis was present among the ascendants of tuberculous patients, they do not record how many times a repetition of the disease could not be ascertained among the descendants of such patients. Only the contributions of *Leudet*² and *Riffel* offer material from this point of view. *Leudet* gives his experiences of a practice extending over 45 years; in 143 families numbering 1485 persons he established heredity in about 50% of the cases. The statistics of

¹Verh. der Berl. Med. Gesellsch. 1901 and 1902.

²Bull. de l'acad. de Med. de Paris, 1885.

Riffel, an elaborate essay on the mortality of tuberculosis based upon church registers extending over 4 to 5 generations of two villages in Baden, are unfortunately not objective in the conclusions of their author. For *Riffel* denies the importance of the tubercle bacillus in the genesis of tuberculosis, since among the cases mentioned by him he alleges not to have found a single one which could serve as an undeniable proof that tuberculosis is transmissible by infection from person to person. And what an important drawback absence of objectivity is in statistics is shown by the ease with which *Kirchner* was able to draw from *Riffel's* own statistics quite different deductions—and rightly so. *Riffel's* statistics also prove nothing more than that tuberculosis is very frequent among the descendants of the tuberculous.

But though there may not be any doubt about this it is surely a mistake to look upon every child of a tuberculous individual as *Maragliano* and *Hamburger* do as a "new tuberculous unit" which is undoubtedly destined to fall a prey to tuberculosis and death. Does not experience teach us daily that such descendants may remain free from tuberculosis as long as they live and on the other hand that some members of such families escape the disease, while others are overtaken by the same fate as their procreators? It is not possible to lay down any definite rules and it never will be possible in spite of all statistics. Because, though inherited predisposition must be regarded as a pathological condition, *Virchow*¹ has already in his classical essay on "Descent and Pathology" pointed out that not every pathological condition necessitates the presence of a disease or is connected with a disease. If the pathological condition of increased predisposition is to become the disease tuberculosis it is under all circumstances necessary that there should supervene the exciting energy of the tubercle bacillus. Considering that the ubiquity of the bacillus has been disproved it should, theoretically speaking, be possible to avoid infection.

We must however remember that although the bacillus may not be everywhere, its diffusion is so enormous that a premeditated attempt to avoid all objects, places and persons that may

¹*Virch. Arch.* Vol. 103.

possibly harbour it could only be described as sisyphæan labour. But since predisposition is a variable quantity, since it may possibly be influenced during life by therapeutic measures, we may conclude that not every individual who has inherited the predisposition acquires the disease as a matter of course, only because the exciting energy of the bacillus is not always great enough and the resistibility of the body not small enough to facilitate the beginning of the disease. It does not therefore follow that a descendant is bound to become tuberculous even if both his parents were afflicted with tuberculosis. It is only thus that we can explain how it is that in some families parental tuberculosis is not transmitted to the children whilst in others all the descendants with or without exceptions fall a prey to it. The question whether and how often a member of such a family who marries a healthy descendant of another family not so predisposed will bring into the world children predisposed to tuberculosis is also unanswerable and will probably remain so in spite of statistics because a child is just as apt to inherit the constitution of its sound parent as that of its diseased one.

In almost all the numerous statistics which deal with the hereditary transmission of tuberculosis very seldom mention is made, under the entry how often the disease occurred among the ascendants of tuberculous individuals, of the mode and time of its origin. And yet this information is of inestimable value to the question of heredity. We must take it that it is highly improbable that a healthy individual descending from a healthy family who becomes tuberculous some time after the birth of his or her children will transmit to them an increased predisposition to tuberculosis; it would for instance be hardly correct to consider so predisposed the descendants of a diabetic patient in whom tuberculosis supervenes sooner or later as a complication of his or her disease. Or is it right to assume that a descendant is predisposed to tuberculosis because an attack of pneumonia in his father ended not with resolution but the supervention of tuberculosis many years after the birth of the former? These and similar cases have nothing to do with the question of heredity. Were we to have statistics on

such points also the results would perhaps be different than hitherto.

Only if the father or the mother was predisposed to tuberculosis at the moment of conception is there a possibility or probability of this predisposition being inherited; with regard to the hereditary transmission of the maternal predisposition we cannot even take into consideration the period of pregnancy up to the time of labour.¹

Permission to marry.—It will therefore never be possible to tell with certainty whether the disease which was present in the parents will also make its appearance in the children. For this reason it is also impossible to lay down any fixed laws with regard to consenting to the marriage of such individuals as are predisposed to tuberculosis. Material or social considerations, occasionally perhaps dynastic motives, must in each single case influence the decision to be arrived at, one way or the other. But if the "higher standpoint of causality" is looked upon as justified in the interests of the welfare of succeeding generations, if the right is conceded to the medical profession to weigh the possible damage to the offspring in opposition to the advantages of the individuals already existing, it behoves us to do our utmost to prevent the marriage of individuals predisposed to tuberculosis, or at least their propagation.

The attempt to restrict the marriage and propagation of tuberculous individuals has however been described by *Reibmayr* as an unjustifiable interference with the natural method of selection. This author tries to prove by minute reasoning and especially on the basis of the works of *Riffel* and *Ammon* that by the marriage of individuals affected with or predisposed to tuberculosis not an increased predisposition towards this disease is inherited, but an increased resistibility against it. In-breeding continuously practised by such individuals would therefore in the course of centuries result in a complete immunity of the human race against tuberculosis. These conclusions though ingeniously arrived at have been rightly called heretical. They are paradoxical and incorrect analogies from natural philosophy

¹See *Orth's* article, pp. 39-45.

which it would be highly dangerous to introduce into practice. For according to *Reibmayr's* erroneous teaching we should have to regard the phthisical habit and the paralytic thorax, as *Scheimpflug* correctly points out, not as symptoms of deficient development but as signs of a higher resistibility. In spite of the able manner in which *Reibmayr* endeavours to prove the correctness of his proposition and the justification of his demand that the marriage and propagation of tuberculous individuals shall be encouraged, experience seems to go against him; his theory is fortunately not practically realisable.

The attempts of the medical profession to prevent as far as it lies in its power and without a dereliction of duty, the marriage of individuals predisposed to tuberculosis will often result in failure on account of the incompatibility of the advice with material, physical or psychological circumstances. For where a proletarian f. i. consults his doctor before his marriage—a thing which does not happen very often—he is not likely to listen seriously to a dissertation on the probabilities of the future. Nor will persons belonging to the better classes often be able or willing to sacrifice their personal happiness or prospects for the sake of those coming after them. To give up the idea of marriage under such circumstances is often an act of heroism of which we read in novels but not one of which the average man or woman is capable. Nevertheless this does not debar the doctor from giving to those who consult him his unbiased and warning advice.

In permitting tuberculous individuals to marry it is necessary to follow certain fixed principles with regard to the different classes of the disease and also with regard to individual cases. If we take the advantages of marriage of tuberculous people on the whole and compare them with the disadvantages and dangers, the latter no doubt preponderate over the former. If it is therefore necessary as a rule to oppose the marriage of tuberculously affected individuals with far more energy than that of persons only hereditarily predisposed to tuberculosis, it is nevertheless, in view of what has been said above, an established fact that circumstances may occasionally arise where the advantages of marriage outweigh the disadvantages, where

there is either no danger at all involved by marriage, or where, if present, such danger may be materially diminished by suitable prophylactic or therapeutic measures.

I have in my mind the following concrete case: A considerable legacy was left by will to an impecunious individual with double apical pulmonary tuberculosis by a rich relative on condition that he should get married. The patient, a cautious and considerate man, who was well aware of his condition, would not marry without the consent of a medical man, and the young lady who was to be his wife was willing to undertake the risk which was explained to her. Under the circumstances I gave my consent to the marriage without any hesitation, reflecting that an improved pecuniary position was more likely to lead to a permanent cure.

Apart from such special considerations, it is of the greatest importance with reference to the question whether tuberculous individuals should be allowed to marry, that differentiation should be made between fresh and rapidly progressing cases and those which are insidious or entirely at a standstill. This is not the place to enter into a minute and elaborate discussion of the delicate signs of complete recovery from tuberculous affections; and although it is generally difficult to prove, there are doubtless many persons who have years or decades previously manifested signs of tuberculous disease of the lungs, such as hæmoptysis, but whose sputum does not contain any bacilli and in whom there are neither physical signs demonstrating the existence of recent changes in the lung-tissue nor subjective symptoms, and whose general state and resistibility may be described as perfectly normal.

The result of test-injections of tuberculin is unfortunately

Translator's note: It would be interesting to have the after-history of this case. A somewhat similar one occurred in my practice some years ago, which had unfortunately a very sad ending. I was practically compelled to consent to the marriage of a young couple who had committed a severe indiscretion. The circumstances were in every sense favourable except that the young man had a family history of consumption, and he himself showed some early symptoms. I had reason to hope for the best, but in less than 2 or 3 years' time I heard that the young husband had died abroad from galloping consumption.

of very little assistance in such cases, but as far as we can clinically prognosticate at all we are justified in assuming complete recovery, and that such complete recovery does take place very frequently has been clearly shown by the researches of *Naegeli*. Under such circumstances and especially in the case of men, it is advisable to explicitly recommend marriage, provided, of course, that there are no unfavourable economic conditions to contra-indicate it. Where ordinary human foresight tells us that in all probability the material circumstances will by marriage undergo a change for the worse, that want and consequently insufficient nutrition and an increased amount of manual labour will in all likelihood cause the recrudescence of old deposits, our advice will certainly tend in a different direction. In the case of females it is necessary to be still more careful in giving the consent to marriage, for the dangers of pregnancy and labour as causes of severe relapses must not in any way be underrated.

In fresh cases of pulmonary tuberculosis the sex of the individual is not of very great importance with regard to the decision whether marriage should be permitted, seeing that this permission will probably have to be withheld in every case. Exceptions, like the one mentioned above, only confirm the rule of prohibition. For it is impossible without constant observation to prognosticate the further course of the disease with anything like certainty. And as the probability is great that the duration of life will be shortened where tuberculosis has made its appearance the prohibition of marriage is a necessary medical precaution. The expectoration of tubercle bacilli in particular requires most careful consideration; a married individual who expectorates tubercle bacilli is a highly dangerous source of infection to his or her married partner, and for this reason alone such persons must be dissuaded from marrying after being enlightened on the subject. On the other hand, it would be disastrous always to draw a contrary conclusion from a negative result of an examination of the sputum, and to be thereby influenced in a sense favourable to marriage; in this important question also, the condition of the sputum must not be the only determining factor. The presence of secondary tuberculosis

of the genito-urinary organs is for the same reasons a strict contra-indication against marriage.

Gerhardt has recommended that tuberculous persons should be advised to wait at least one year before being permitted to marry. This interval appears to *Jacob* and *Pannwitz* to be too short. From what we know of the biology of the tubercle bacillus, its vitality and activity in the human body during a period of 3 years is by no means impossible, and 3 years should therefore be the minimum interval of postponement. If there are no signs of the progress of the disease during that time, such as hæmoptysis, pleurisy, physical signs of fresh specific catarrh over the apices of the lungs, renewed expectoration of tubercle bacilli, strong subjective symptoms, emaciation and night-sweats, the possibility of consent to the marriage may come into consideration. It is moreover always the duty of the medical man, as *Virchow* would have it, to ignore all physical and sentimental motives and to call the attention of the patients to the uncertainty of the latent stage of tuberculosis. In any case the doctor must see that the candidate for marriage does not leave his intended wife or her relatives in the dark with respect to his condition and the uncertainty of the prognosis, where he cannot for reasons of professional secrecy convey the information himself. Because the dangers of moral disappointment are never so great as those of even latent tuberculosis.

It is therefore clear that the decision on the part of the medical man as to whether a tuberculous individual may marry or not, is one of the most responsible which fall within his province. But just as important and just as significant are his duties and obligations towards the family, where one or the other of the married partners is the subject of tuberculosis.

Sexual intercourse during married life.—In such cases it will hardly be possible to avoid instructing both husband and wife with regard to the frequency of their sexual intercourse, a point which is still in the eyes of many forbidden ground. Seeing that tuberculous individuals are often the subjects of increased sexual desire, the danger and injuriousness of too frequent sexual intercourse must be pointed out to them,

and attention must be paid as far as possible to all those elements which co-operate in producing the increased desire, and the necessary therapeutic treatment must be instituted towards its removal. Where the genital organs exhibit tuberculous changes intercourse will on account of the danger of infection to the other partner have to be permitted in the form of condomatic coitus only.

Prophylaxis in the married life of tuberculous persons.—From a prophylactic point of view it is desirable where the pecuniary circumstances permit it that the tuberculous husband or wife, especially if the expectoration contains tubercle bacilli should occupy a separate bedroom. Where this is not possible it is at least advisable that the beds of husband and wife should be placed as far from one another as the size of the room will allow. The remaining prophylactic precautions are the same as those indicated in every case of tuberculosis. Kissing must be altogether prohibited, and not only on the mouth. A careful removal of the sputum and disinfection of the sputum-holder is essential as are also the use of separate utensils, the adoption of certain precautions with respect to personal linen, special cleanliness of water-closets where one of the inmates of the house suffers from secondary intestinal tuberculosis, etc., etc.

Artificial abortion.—In addition to these general prophylactic measures special importance attaches to those indicated when a tuberculous woman becomes pregnant or when a woman exhibits undoubted signs of pulmonary tuberculosis in the course of her pregnancy. For years, even after pregnancy had ceased to be regarded as a natural aid in the treatment of tuberculous processes, the medical profession considered it the right thing in such cases to remain as a rule silent spectators. Partly from religious scruples, partly from legal considerations¹ and partly also because the significance and dangerousness of the interference were not thought commensurate with its probable advantages, medical men were averse to the idea of arresting the pregnancy prematurely, by the induction of artificial abortion or of premature labour.

¹Kossmann. Verh. d. Berl. Med. Gesells. 1901.

The first to anticipate beneficial results from such a course of action was *v. Leyden* who says in the conclusion of his work on the complication of pregnancy by chronic diseases of the heart as follows: "The question, whether in cases of tuberculosis it is not possible to arrest occasionally the weakness of the heart and to preserve the life of the woman by putting a premature end to the pregnancy, is of especial importance on account of its frequency. My experience tells me that tuberculosis in women is doubtless aggravated by repeated pregnancies."

Gerhardt also, in his lecture on the contraction of marriage by tuberculous individuals, emphasizes that where a pregnant woman surely and steadily loses strength in consequence of the disease of the lungs the question, whether the condition of the mother justifies the medical man in inducing artificial abortion, must doubtless be answered in the affirmative. Particularly so, as in cases where tuberculosis makes its first appearance at the beginning of the pregnancy a possibility to treat it successfully by the administration of hygienic-dietetic remedies can often be obtained only by the artificial interruption of the pregnancy.

The question of the advisability of abortion in tuberculosis has however found an almost enthusiastic supporter in *Maragliano*: he demands that the pregnancy of every tuberculous woman shall be artificially interrupted. We must not wait until special disturbances or dangers have arisen to the patient by the pregnancy, either from purely mechanical conditions or as a result of disordered nutrition: the more circumscribed the tuberculosis and the better the general condition the more this interference is called for. The standpoint from which we should look at the matter is not that of symptomatic advisability, but rather "the highest standpoint of causality." *Maragliano* concludes literally as follows:

"If we mean seriously and intentionally to protect humanity against tuberculosis it is necessary to divest ourselves entirely of all sentimentality with respect to the hypothetic rights of the fœtus, and to consider the latter altogether of secondary importance as compared to the mother. If we bear in mind at the same

time the great influence which the mother exercises upon the organism of the future being, including a possible transmission of the disease to the latter, the interference becomes still more justified, since by it we not only cause positive advantage to the mother who is saved from the dangers of the pregnancy, but we at the same time prevent the addition of a further tuberculous unit to mankind in general."

Since 1893 *Maragliano* has in his clinic carried out this principle, and his personal experience has convinced him that the patients get better and are "cured" soon after the evacuation of the uterus.

With regard to the interruption of the pregnancy in tuberculous women it is necessary to distinguish on principle between induction of abortion and induction of premature labour. *Kleinwächter* and *Schauta* recognise generally very few indications for the induction of abortion; the former, especially because he does not consider the prognosis absolutely favourable, even if the operation is conducted with all possible care, seeing that it produces a violent commotion in the whole organism of the woman, a circumstance bound to have great effect in the case of one suffering from disease; the latter because he thinks the result of the operation very unreliable.

In the Berlin Royal Policlinic for patients with lung-diseases the question of the advantages and disadvantages of artificial abortion in tuberculous women has for about 4 years received very careful consideration. The operations have been performed by medical men with a specialist training, and there has never been any complication or unfortunate accident in connection with the cases, a fact worth special mention in view of *Kleinwächter's* pessimistic opinion. As regards the influence of the operation on the disease, the statistics published by me in 1901 show that there has been an aggravation of the condition in 30% of the cases, 12% ended in death after a more or less continued treatment, and 70% remained at a standstill. The cases which have been admitted since, do not give any materially different percentages. But as to a "cure" such as *Maragliano* says he has often seen, there has not been, as it was fully to be expected, a single one; for pregnancy is not the

exciting cause of pulmonary phthisis. Subsequently *Kuttner* has included in his observations the question of the induction of abortion in tuberculosis of the larynx, and has energetically recommended the operation in certain cases.

Hamburger has in like manner taken up a definite position on the question especially in reference to working-women, and inclines to the view of *Maragliano*, the so-called "higher principles of causality." He is in favour of abortion being performed in every tuberculous working-woman, if there is no doubt about the diagnosis, and as a decisive criterion for the latter he regards the presence of tubercle bacilli in the sputum. This generalisation, even for special classes, is for this reason not desirable and occasionally even injurious, because as we have already seen not every case of tuberculosis, not even in working-women, is aggravated by pregnancy, and because on the other hand, not every case of tuberculosis which has been aggravated by pregnancy can be arrested in its unfavourable course by the induction of abortion.

The operation is least justified in those advanced cases the prognosis of which may be regarded as hopeless—with or without pregnancy—and where we can hardly expect to prolong the life of the patient, but where there is on the other hand a chance of a living child being eventually born. The fear of *Maragliano* and *Hamburger*, which is not always justified, that a further tuberculous unit will be added to mankind would if carried to its logical conclusion render abortion indicated in those cases also where the father is tuberculous.

The contra-indication on account of the bad prognosis must apply to the majority of the cases of laryngeal tuberculosis (*Löhnberg*); because, although it is proved that tuberculosis of the larynx may in rare cases occur primarily and be cured, yet as a rule it is secondary and present in very severe pulmonary affections only. For this reason *Löhnberg* is quite right when he maintains that the restriction to exclude all hopeless cases must unfortunately embrace almost entirely the tuberculous diseases of the larynx. *Kuttner's* recommendation will therefore but very seldom be acted upon in practice.

The operation may be carried out only in such cases where

judging from our knowledge of tuberculosis there is a possibility that the disease may be cured or an improvement obtained which will certainly last for years. If in the course of such cases pregnancy supervenes, and a marked aggravation of the pulmonary disturbance or in the general condition becomes apparent which is the direct consequence of the pregnancy only, the question of the induction of artificial abortion may arise as a possible therapeutic measure; likewise if in the course of a pregnancy the first symptoms of tuberculosis make their appearance, or if hæmoptysis, metastatic tuberculosis or pleurisy occurs. Especial regard must always be paid to the physical condition of the patient, or as *v. Leyden* calls it, to her "disposition." It is therefore understood that we are not under any circumstances obliged to induce abortion in tuberculous pregnant women. This important question cannot, as *Margliano* desires, be answered generally, but must be decided individually in each separate case. We must however always remember that the possible help thus rendered to the mother is dearly bought, bought at the cost of a future human life, and that the sacrifice should at least be compensated for by a substantial gain to the mother.

Artificial premature labour.—The second possibility at our command, namely the interruption of the pregnancy by the induction of artificial premature labour, is an interference which is justified on the rarest occasions only. The dangers of pregnancy in tuberculous women are greater, the complications more frequent and the suffering of the patients more severe during the first months of the pregnancy than during the last, and rapid aggravations are to be feared only from the moment labour-pains set in until the end of the puerperal state. What *Gusserow* has rightly pointed out with respect to pregnant women suffering from heart disease, namely that the danger of labour diminishes in proportion to the rapidity of the labour act, applies equally in the case of those suffering from tuberculosis. The induction of premature labour is an uncommonly difficult operative interference, the consequences of which to the whole organism are not to be compared with those of artificial abortion. The pains are exceedingly weak, the delivery

lasts much longer than in normal labour, often several days, and for this reason artificial premature labour causes in 90 cases out of 100, as *Gusserow* also truly says, a much severer task and consequently a much greater danger than normal childbirth.

With the idea to help the mother, the induction of premature labour is therefore never to be recommended. The possibility of its indication exists only where the debility of the mother becomes rapidly so much worse, that her death is likely to occur before the normal end of the pregnancy and that the life of the child can only be saved by the artificial interference.

Prevention of conception by tuberculous women.—If we bear in mind the dangers which tuberculous women incur by becoming pregnant, and the narrow limits within which we may resort to artificial abortion; if we recollect the fact that although the operation is in many cases likely to be successful, we can never foretell the success with certainty, it will be regarded as one of the principal duties of the physician to endeavour by all the possible means at his disposal to prevent the conception of tuberculous women. (In another chapter of this work will be found a dissertation on the utility of these preventive means.) The justification of their application does not lie in the intention to prevent the propagation of tuberculous individuals as “future tuberculous units,” but exclusively in the attempt to save the tuberculous woman from the dangers with which she is threatened in consequence of conception.

Prohibition of lactation by tuberculous women.—There remains yet to be mentioned that in numerous cases where tuberculous women have had normal labours, the lactation is to be strictly prohibited, whether the pregnancy and childbirth have been well borne or not. Moreover, seeing that lactation makes great demands upon the whole organism, it is necessary to forbid it even in such cases where the diagnosis is not absolutely certain and where there is only a suspicion that the mother is predisposed to tuberculosis. It is equally necessary to wean the child immediately, where the mother commences to show tuberculous symptoms in the course of the lactation-period.

2. *Bronchial Asthma.*

Next to tuberculosis bronchial asthma is of the chronic diseases of the respiratory organs the one which deserves perhaps the greatest amount of consideration from the point of view of those who are about to contract marriage. Not, of course, to the same extent as tuberculosis, since all those factors which are of such enormous importance to the whole of mankind where the question of marriage arises in connection with tuberculous persons are absent in asthma, a disease which is, by the way, relatively very prevalent. For the bronchial asthma of the husband or wife causes no danger to the other partner, but at the outside a certain amount of inconvenience and discomfort. Nor is the opinion of some authors that the disease is particularly often inherited sufficiently proved by statistics, or generally shared. It is true that *Salter*¹ has been able to demonstrate heredity in 40% of his cases, but *Berkart*² could not do so in more than about 16% of all those which he has observed. At any rate the number of cases upon which both these statistics are based is too small to permit a decisive conclusion with regard to the theory of the hereditary character of asthma to be drawn from them. The fact that the disease is occasionally present both in the parents and in one of their children does not justify its inclusion among the genuine hereditary diseases. On the other hand *A. Fränkel*³ points out that the family predisposition need not necessarily manifest itself in such a manner that the parents particularly suffered from asthma; but different brothers and sisters may exhibit the disease and yet the parents may have been always free from it.

There is consequently more reason to attribute the common disease to some common cause as f. i. rickets during childhood, which has very often been accused in this connection. But this is also an hypothesis which has very little in its favour, seeing how difficult it is to bring it into agreement with the general view prevalent at the present day that bronchial asthma is a reflex neurosis.

¹The Asthma. London 1860.

²The Bronchial Asthma. London 1883.

³Spec. Pathologie u. Ther. d. Lung. Vol. II, Berlin 1902.

Only by holding this opinion it is possible to obtain a uniform notion with regard to the collection of symptoms which we call bronchial asthma and which is the result of so many different causes. According to *Fränkel*,¹ the peculiar constitution of the nervous system of the sufferer from asthma which is responsible for the predisposition to the disease is the outcome of an hyperæsthesia of the nervous regions which are in immediate relationship with the respiratory tract. Theoretically it ought to be possible to say that the more circumscribed the point of excitation (nose, uterus) the better the prognosis on account of the greater ease with which therapeutic remedies can be applied, and that the prognosis is worst where we do not know the locality of irritation at all, and where we must suspect the cause of the bronchial spasm to lie in the abnormal irritability of the bulbar respiratory centre.

But although the simultaneous occurrence of nasal polypi and bronchial asthma, first demonstrated by *Voltolini*, and to which *Hack* afterwards added diseases of the lower muscles, led in a number of cases to a cure of the asthma by local treatment, this success was not achieved in a perhaps far greater number of cases.

It is therefore, to say the least, very uncertain whether the prognosis of such cases of asthma which rest upon abnormalities of the nasal mucous membrane may be declared particularly favourable, and this is a circumstance not without importance with reference to the question of consent to marriage.

Neither does the better defined sub-division of the disease from the standpoint of prognosis, as suggested by some asthma-therapists (*Bruggemann*)² offer any practical guide for judging beforehand the course of the disease and a possibility of really successful treatment.

Consent to marriage in cases of bronchial asthma.—For although our knowledge of the genesis and course of asthma is greatly increased, it cannot be denied that our ability to treat the disease otherwise than symptomatically has with the above-mentioned exceptions remained the same as

¹*A. Fränkel*, l. c.

²*Das Asthma*. Wiesbaden 1901.

before. And if in a few cases there has been a spontaneous cure, asthma must on the whole be included among the incurable diseases. The disease extends, however, over such a long period of time, and the duration of life in those suffering from bronchial asthma is by so little different from what it is under normal circumstances, that it can hardly always be regarded either in the man or in the woman as a decided impediment to marriage. The case is however different where the usual results of long-standing asthma and of frequent attacks, such as severe emphysema, hypertrophy and dilatation of the right ventricle, tricuspid regurgitation or renal-disorders, have made their appearance. The frequency of the attacks is also of decisive prognostic importance; for although death very seldom ensues during an attack, it must be taken for granted that the longer the interval between two successive attacks, the slower the rate at which changes in the lungs and in the heart take place. It is also, perhaps, worth mentioning that the kind of "asthmatic diseases" which are to be regarded almost exclusively as idiosyncrasies, that is, which appear only in consequence of certain conditions (climatic injuries, hay-fever) can never form a contra-indication in the contraction of marriage, since the causative factors can easily be avoided.

Sexual intercourse and pregnancy in bronchial asthma.—As regards the bronchial asthma of young girls, there have been several cases observed where marriage had a beneficial effect.

Thus *Peyer*¹ mentions the case of a girl who was asthmatic, who married, became pregnant and gave birth to a healthy child. During the time of pregnancy she was absolutely and perfectly well. Later on, the attacks appeared again, and were removed by local treatment of the uterus. The writer has also seen a striking case of improvement in an asthmatic young married woman. Before her marriage the attacks used to occur on an average every 4 weeks; after she was married the number of the attacks diminished so considerably that there were often intervals of 6 months and longer between any two of them.

This phenomenon is probably associated with the exercise

¹Berliner Klinik. 14.

of the sexual function, as we must assume that by the gratification of the desire there is caused a reduction in the general irritability of the nervous system and consequently also in that of the nervous tracts connected with the attacks.

There have only been very few communications made on the course of pregnancy in asthmatic women, which may probably be accounted for, by the fact that no peculiarities or complications have been noticed. For this reason it is perhaps advisable that I should mention the case of an asthmatic female outpatient in whom I observed an especially great inclination to miscarriages, all of which happened after asthmatic attacks and which were probably in close causal relation to the latter.

The question may also crop up occasionally whether the presence of bronchial asthma justifies recourse to artificial abortion.

Generally speaking, the necessity for this will, in view of the nature and prognosis of the affection seldom arise. The operation will have to be performed only where in the course of the pregnancy the attacks are so frequent and of such long duration that the life of the mother is in danger. This is however likely to happen but in rare instances.

The question whether asthmatic mothers should be permitted to suckle their infants is also not likely to form very often a subject of doubtful consideration. For although special influences on the course and severity of the disease are hardly ever likely to be noticed, it is nevertheless advisable as a rule to recommend sufferers from asthma to refrain from lactation since the secretion of milk must exercise a debilitating effect upon their organism.

3. *Emphysema.*

The significance of the remaining chronic diseases of the lungs with regard to the married state is to a certain extent a limited one. A large number of them, such as malignant tumours of the lung, larynx and mediastinum (carcinoma, sarcoma) have, where they can be diagnosed, such an absolutely bad prognosis that the question whether an individual affected with one of them should be permitted to marry or not is not

likely to give rise to any discussion at all; with regard to others, such as actinomycosis, echinococcus, syphilis of lung, etc., there does not seem any necessity to dwell on the point, partly for the above-mentioned reasons, and partly also because these diseases are so infrequent that they may well be designated as clinical rarities. With regard to the rest of the pulmonary and laryngeal diseases we may generally say that though they are relatively very prevalent, they diminish but very little the life-duration of those who are subject to them, and do not very materially lower the activity and working ability of the patients. Some of the affections finally commence fortunately—at least as a rule—at a time of life when the contraction of marriage is only exceptionally thought of.

A somewhat more detailed consideration however seems indicated with respect to *emphysema*. As to the genesis of emphysema opinion does not appear as yet to be unanimous. Only that much is certain, that emphysema is occasionally, though not very frequently, observed at an early age, and that it is not always a consequence of chronic bronchitis. And moreover as the disease appears sometimes in young persons as a result of occupational injuries (blowers) the physician may have the question addressed to him whether an individual suffering from emphysema should be allowed to marry or not. The answer must undoubtedly be in the affirmative; for although a man subject to emphysema cannot on account of his dyspnoea be regarded exactly as an ideal husband his working ability is nevertheless not materially diminished and his probable expectation of life, should no secondary symptoms appear, is only slightly shortened. But where the consequential results of emphysema which are practically the same as those of bronchial asthma have already made their appearance, marriage will probably have to be opposed in the generality of cases.

Emphysema is far more rarely present in women than in men and this fact as well as the circumstance that peculiarities are hardly likely to occur, explain how it is that there are no detailed contributions to literature on the course of pregnancy, labour and childbed of emphysematic women. It is, however, to be presumed that the shortness of breath is in pregnant

women as a rule considerably aggravated by the high position of the diaphragm and that the sequelæ of emphysema may thus possibly be hastened. For this reason it does not exactly appear desirable that emphysematic women should become pregnant, but on the other hand the danger is not so great as to justify the adoption of anti-conceptional remedies or the artificial interruption of existing pregnancy. Lactation on the part of emphysematic women may also unhesitatingly be permitted, though there may be special cases where it is contra-indicated.

4. *Chronic Diseases of the Bronchi.*

Chronic bronchitis.—Chronic bronchitis is also to be regarded as a relatively harmless complaint. The often repeated assertion that ordinary bronchitis may turn into tuberculosis is not scientifically proved, and such a transition is very seldom seen in practice. Chronic bronchitis has no influence in shortening the life of those subject to it, and cannot therefore be looked upon as an indication against marriage. Nor has ordinary bronchial catarrh any effect upon pregnancy. *Fellner*¹ attributes to it only a slight increase in the cyanosis and in the dyspnœa which is a physiological accompaniment of pregnancy.

Fibrinous or plastic bronchitis has probably on account of its prognosis been sub-divided into an acute and chronic form. In the acute, the prognosis is always very uncertain and very serious because of the possibility of death by suffocation through the fibrin coagula. For this reason it is not advisable to give the consent to marriage too soon. The chronic form of fibrinous bronchitis has a much better prognosis. It often disappears just as quickly as it appears, without it being possible to find any special causes for its appearance or disappearance. Thus, f. i., I have been watching a case for the last 4 years (minutely described by *v. Raven*² which has been running its course since 3½ years without any symptoms whatever. *Chronic* fibrinous bronchitis, where it is not to be regarded as a complication of other organic diseases (heart

¹Die Beziehungen innerer Krankh. zu Schwang. Geb. u. Wochenbett. Leipsic-Vienna 1901.

²Zwei Fälle von Bronch. fibrin. Dissert. Berlin 1902.

disease, tuberculosis) will therefore in the generality of cases not form an obstacle to marriage.

Foetid bronchiectasis and bronchitis.—As regards, finally, those diseases of the respiratory organs the principal feature of which consists of a more or less marked fœtor of the breath, such as fœtid purulent bronchitis, the saccular, cylindrical and multiple forms of bronchiectasis, this defect alone is sufficient to cause some hesitation in the granting of the permission to marry, since it must prove a constant source of disgust to the married partner living in close intimacy with a person thus affected. For this reason and from the fact that the prognosis of this disease is an exceedingly serious one (much more serious in bronchiectasis than in purulent bronchitis, which may occasionally terminate in recovery) we may draw the conclusion that individuals suffering from these diseases of the respiratory organs must be energetically advised not to marry.

XII

Diseases of the Organs of Digestion in
Relation to Marriage

XII

DISEASES OF THE ORGANS OF DIGESTION IN RELATION TO MARRIAGE

By **Professor C. A. Ewald** (Berlin)

If we consider the reciprocal relations between marriage and the functions or disturbances of the digestive organs from the medical point of view we find that the gain which accrues to the organism from this union is undoubtedly like in so many other respects greater in the case of the male sex, and that the poor wife derives from the married state a plenteous harvest of ill-health. The salubrious advantages which marriage brings to her are decidedly outweighed by the disadvantages. For this reason the greater part of the following remarks will be taken up by diseases which affect the female married partner.

In point of fact the above statement hardly requires any proof; the latter will doubtless become evident from the subsequent observations.

Beginning first with that which is common to both husband and wife, it is clear that the gain which an harmonious and happy marriage must bring to both of them generally, and in respect of the digestive functions in particular, is so obvious that it is not necessary to waste any words about it. Psychical and physical well-being towards which a well-regulated sexual intercourse contributes a by no means unimportant share co-operates in influencing favourably the course of the vegetative functions, and in especial those of the digestive organs. It is only after they are married and free from the dull oppression and unsatisfied longing of bachelor-life that many men begin to understand what it means to be healthy in body and healthy in mind.

On the other hand, the disturbances of digestion which we

must attribute to married life are partly of an indirect and partly of a direct character.

Disturbances of digestion through psychological factors.—To this category belong all those factors which influence the soul directly and the digestive tract only indirectly, and which are called forth by the troubles and perturbations connected with the married state. Naturally this refers to the husband no less than to the wife.

Nervous complaints.—The struggle for existence and the maintenance of the children, illness in the family and other anxious cares react in many individuals on the digestive apparatus and produce the most various disturbances in the same. This is ancient wisdom, and *Shakespeare* knew what he was saying when he makes Henry VIII pronounce sentence of death on Cardinal Wolsey by the words: "Read over this, and after this: and then to breakfast, with what appetite you have." These disturbances may affect all parts of the digestive tract, from the mouth down to the large intestine and anus, and manifest themselves by most variable so-called nervous complaints. There are people who when they are troubled or excited cannot "swallow a bite," not because the mechanism of deglutition is out of order, but because the secretion of saliva is insufficient and the food-boli are consequently not rendered slippery enough to be gulped down the entrance into the œsophagus, so that they "stick in the throat." In others there occur conditions of depression in the secretory and motor functions of the gastrointestinal canal. If the gastric juice is examined in such cases, the analysis shows a diminished amount of *HCL* and of pepsine, often associated with the characteristic symptoms of motor weakness or of atony of the muscular walls of the stomach. This applies also to the intestines. Tendency to flatulence, constipation or an irregular action of the bowels accompanied by intercurrent pseudo-diarrhœic evacuations are the most prominent symptoms. I have never yet under such conditions noticed an inclination to an increased action of the stomach, say in the form of hyperchlorhydria, or gastrosuccorrhœa, etc. This might possibly be said to be the case with the intestines which show occasionally a tendency to increased peristalsis or better

said to more frequent evacuations. But this occurrence also is perhaps due to a weakness of the large intestine rather than to an increased function of the small intestines. What part is played in these disturbances by an altered activity of the liver is for the present entirely beyond our knowledge.

But in other directions as well, married life is capable of producing all kinds of injury to the digestive functions. I allude to the nervous disorders which arise from an excessive sexual intercourse or from an abnormal performance of the sexual act. Both are more frequent than one would imagine and we hear occasionally most incredible confessions in this respect. There is no necessity to enlarge on this point which has already been discussed in a previous chapter (see Article by *Fürbringer*) of this work, but I wish to point out that it is the various forms of the preventive mode of intercourse which most pre-eminently seem to occasion nervous reflexes upon the digestive tract. Probably more for moral than physical reasons, but possibly also because newly married people in particular are apt when practising preventive intercourse to disregard the natural abstinence imposed by pregnancy and parturition, and thus to create a constant irritability of the nerves constituting the pudendal plexus and also of the nervous system generally. One might retort against this that in sterile marriages there is also no "close-time" and yet they do not show any particular predominance of nervous and especially nervous-dyspeptic conditions. I have however frequently been assured by gynæcologists that in precisely this sort of marriages, a certain sexual frigidity often appears very early which excludes the possibility of sexual over-indulgence. However that may be, there is no doubt that we see cases by the hundred in which the beginning and progress of nervous gastro-intestinal disorders may be traced to this source. It is only natural that we should meet it oftener in men than in women, since the latter do not altogether experience as a rule such severe perturbations of the nervous system from the exercise of the sexual act as the former.

1. *Diseases of the Stomach and Intestines.*

We know nothing certain about a direct infection or trans-

mission of an organic disease of the digestive apparatus from husband to wife or *vice-versa*. All that we might perhaps have to consider in this connection are cancerous and possibly also tuberculous affections which may appear in the course of the gastro-intestinal tract. Cases have repeatedly been observed of husband and wife who have been attacked in quick succession by cancer of the stomach or of the intestines; but whether we should in such cases admit a direct transmission of the disease through the common use of utensils, such as spoons, forks, knives, cups and plates, etc., is, on account of the incomplete knowledge we possess on the etiology of cancer, impossible to say.

Influence of marriage on the digestive functions of the husband.—As regards the sterner sex, it is unquestionable that marriage is in the case of many young men a beneficial change from their bachelor-life and the deficient and irregular meals often associated with it and no less often compensated for by excessive drinking. The possession of a well-regulated home of one's own brings as a rule to the abused and over-irritated gastro-intestinal apparatus careful and suitable nourishment and attention. The provision of suitable food and especially of food for invalids, is indeed often a serious difficulty in the case of bachelors who have not their own household, particularly in small towns, although philanthropic societies have recently been formed f. i. in Berlin, to supply the deficiency to a certain extent by the establishment of public kitchens for invalids which distribute proper food in the various parts of the town. In some places proprietors of restaurants are also prepared to supply the requisite dietary articles according to prescription. But on the whole, these arrangements do not apply to the vast majority of men, and it is the married state in which most bachelors hope to find the food suited for their individual cases.

Translator's note: The author has evidently forgotten to add that the same cause may have operated in producing cancer in both the husband and the wife, seeing that they are constantly exposed to the same injurious influences, and that infection from person to person may have nothing to do with the matter.

It is not only invalids, however, who derive benefit from marriage; the well-regulated mode of life with its regular and uniform meals usually associated with the married state is to healthy husbands also an advantage by no means to be despised. To this we may add that a considerable number of men, from a sense of the responsibility involved by the creation of a household, abstain from a number of extravagances which would otherwise undoubtedly cause gastric and intestinal troubles. This is so self-evident that we can dismiss the subject with these few words.

These advantages are counterbalanced by the few inconveniences or disturbances which arise to the husband from the married state and which have already been enumerated above.

Influence of marriage on the digestive functions of the wife.—The special effects which married life exerts on the digestive apparatus of the wife are connected in the first instance with the functions of the generative organs, especially with pregnancy, childbed and its results. These form the principal source of many troubles but rarely that of any benefit to health which accrue to the wife from the married state.

Influence of pregnancy and puerperium.—If we follow the course of the digestive tract from the mouth down to the anus we find everywhere the influences of the generation-processes marked out sometimes lightly and sometimes strongly, sometimes temporarily and sometimes permanently. And it is not only the digestive canal proper, but also its adnexa, and above all the liver which are affected. We should really have to give here the pathology of pregnancy and child-bed, did we wish to include a detailed description of all the conditions which present themselves in this connection—and this, we do not consider, that we are called upon to do. We cannot however omit a brief examination of them.

The mouth.—Beginning with the oral cavity we have to mention first of all one of the most frequent of its affections which occur during pregnancy, namely toothache, and its frequent companion, carious disease and destruction of the teeth, which however appear sometimes without toothache and which

lead in time to the loss of the teeth. Hence the well-known saying, that each child costs its mother at least one tooth. Associated with this are inflammatory processes at the gums (gingivitis, hypertrophia gingivarum) and hæmorrhage from the same; and a fairly frequent occurrence is also a general hyperæmia of the buccal mucous membrane which manifests itself by redness, swelling and a tendency to hæmorrhages. As to the cause of these conditions we cannot say anything definite. Like in so many other disturbances which we come across, some authors assume a reflex process emanating from the uterus, an explanation by which, as *Kehrer* rightly says we only hide insufficiently our ignorance of the internal physiological processes, whilst others see a direct cause in the altered reaction of the saliva during the time of pregnancy. An observation by *Galippe*,¹ so far not supported by others, has shown that the saliva of pregnant women becomes acid in reaction, loses its quantity of ptyalin, and favours for these reasons perhaps the development of micro-organisms which act destructively on the teeth. Others, again, believe that the maternal organism is called upon to supply calcium salts out of bones and teeth for the benefit of the fœtal skeleton,² in which case it is rather surprising that the teeth should be attacked in the first instance, and so severely, too, whilst the other bones—if we do not take into account the rare cases of osteomalacia—remain quite unaffected. This would also not explain how it is that as a rule only such teeth are attacked which were already diseased previous to the pregnancy, and why women with sound teeth which they are in the habit of keeping scrupulously clean escape as a rule altogether. And though we can understand the reason of the toothache as a symptom of dental caries which has reached to the pulp, how about the local hyperæmia, and how can we explain the vomiting of pregnancy which we shall consider later on? With regard to these and other phenomena, there really remains nothing for the present but to admit a

¹*Galippe*, Influence of the Sex on the Resistance of the Teeth. *Gaz. d. Hôpit.* 1885. No. 17.

²*Kirk*, Dental caries in pregnancy. *Philad. Med. Times*, 1880, March 27,

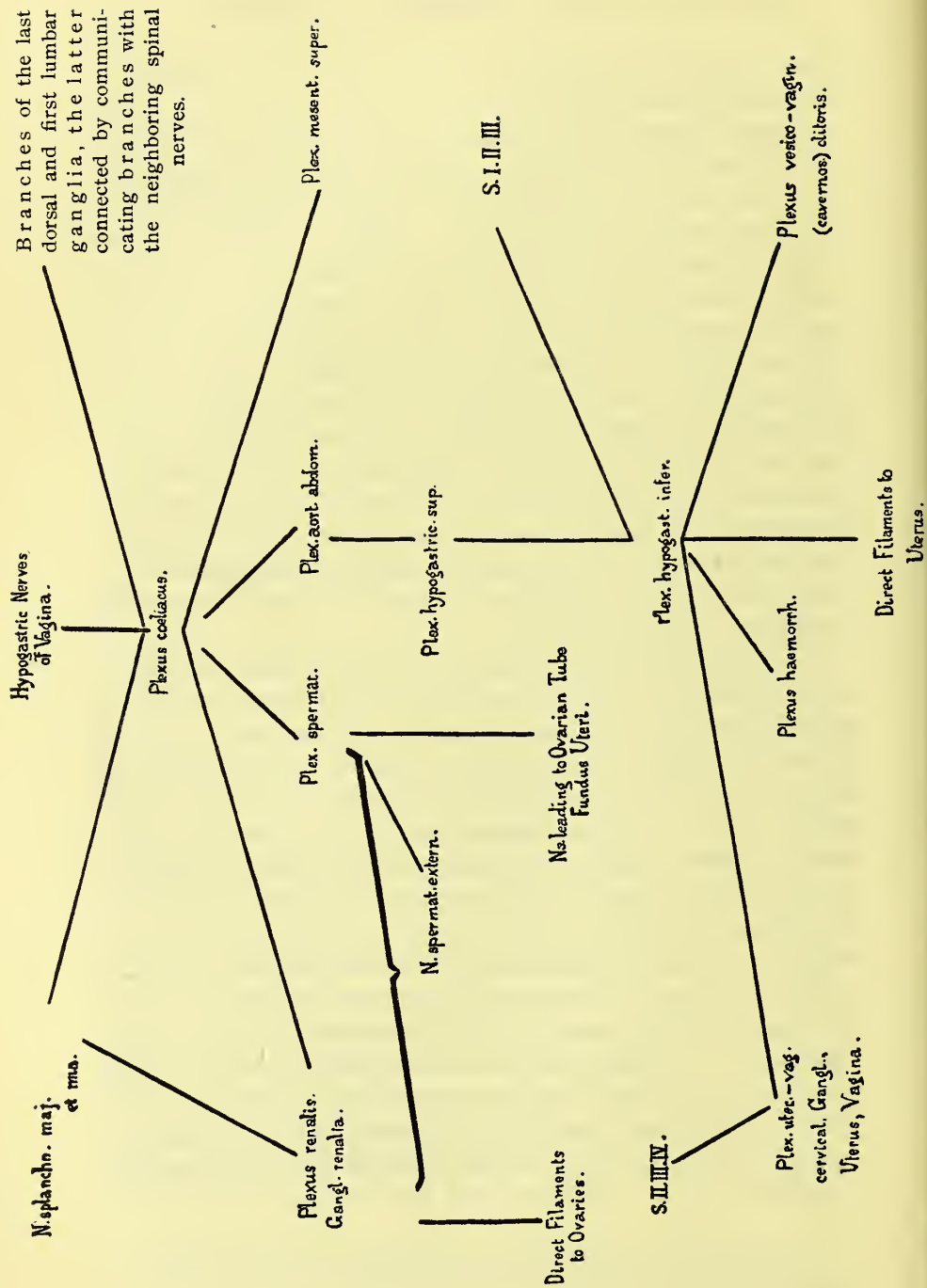
reflex action, notwithstanding the taunt of *Kehrer*, the justice of which we must recognise.

It may however be perhaps of some interest and helpful in understanding the rationale of these reflexes if we reproduce here a diagram by *Eisenhardt*¹ of the nerve-branches in the abdominal cavity, which shows at a glance the course of the nerves proceeding from the genital organs.

Ptyalism.—Among the reflex neuroses is also included ptyalism, or salivation, which comes principally from the sub-maxillary glands, but also from the parotid. The secreted saliva attains sometimes enormous quantities and may amount to as much as 2 litres in the 24 hours. It is said that this saliva does not contain either ptyalin or sodium salts. As to ptyalin I am in a position to affirm the contrary. I have years ago made numerous experiments on the ferment of the saliva and occasionally in married women as well, but strange to say I have never known it to be absent, not even in acute inflammatory conditions of the buccal cavity.

As long as there is nothing more than ordinary salivation, we have before us a disagreeable but by no means dangerous complication which appears principally in the first months of pregnancy. But when the secretion assumes great proportions the swallowed saliva produces occasionally vomiting and the salivation may become so intense that the saliva runs from the mouth in streams night and day incessantly, and nutrition suffers considerably. Cases are known where the condition has led to extreme prostration or even death. Under such circumstances it becomes imperative to institute artificial abortion, especially as the ordinary remedies generally adopted, such as *duboisine*, *atropine*, *potassium iodide*, *pilocarpine*, are as a rule ineffectual. That the conditions are probably reflex in origin may be inferred from the circumstance that *Lwoff* was able to obtain a rapid cure through the cauterisation of an erosion in the cervix uteri, and *Audibert* one through the reposition of a retroflexed uterus. Some authors also regard ptyalism as a

¹*Eisenhardt*, Die Wechselbeziehungen zwischen internen und gynäkolog. Erkrankungen. Stuttgart. 1895.



premonitory sign of threatened eclampsia but *Fellner*¹ has been unable to find among numerous cases of the latter disease one single case of ptyalism.

There remain yet to be mentioned *aphthous stomatitis* and *glossitis* which are occasionally noticed during pregnancy and lactation.

It might be possible, as *H. W. Freund*² thinks, to explain all these cases simply by assuming that the secretion of certain substances from the ovaries into the blood excites the salivary glands to special activity. The physiological salivation during sexual excitement would seem to support this theory. An infection of the parotis through virulent bacteria is, on the other hand, to be assumed in those rare cases, in which an abscess of the parotis has been observed in connection with puerperal infection, which was, strange to say, confined to the parotis. (*Löhlein, Curé*).

Vomiting in pregnancy.—Connected with this subject is the vomiting in pregnancy which, if it occurs in excess, is designated as hyperemesis. We find this condition in about 50% of all cases. Primiparæ and women in the first 3 months of their pregnancy are most frequently affected. About half the number vomit in the morning only. The process always takes place easily and without any special warning, the food previously taken is evacuated and a good appetite is soon afterwards re-established. In other cases however vomiting occurs also on an empty stomach. Pain is felt in the epigastrium, there is a disinclination against food of any kind, unquenchable thirst, and a dry tongue. In such cases there may result extreme emaciation, an anæmic condition and severe psychological apathy. The extremities are cold, the pulse small, the face appears haggard, and the whole condition makes a most alarming impression. The more so since in many cases treatment seems to be

¹*O. O. Fellner*, Die Beziehungen innerer Krankheiten zu Schwangerschaft, Geburt und Wochenbett. Wien 1903 p. 106 ff.

²*H. W. Freund*, Die Beziehungen der weiblichen Geschlechtsorgane in ihren physiolog. und patholog. Veränderungen zu anderen Organen. In Lubarsch u. Ostertag, Ergebnisse der allgem. Pathologie u. patholog. Anatomie. 3. Jahrg. Wiesbaden 1889. Here and in *Fellner's* work, 1. c. numerous literature is quoted.

altogether useless. The usual sedatives, such as bromide of potassium, chloral, cocaine, morphia, administered internally or hypodermically, belladonna, asafœtida—the favourite of an old generation of medical practitioners—sucking of ice-pellets, and the blandest possible diet, lavage of the stomach, electricity and other numerous remedies are in severe cases absolutely no good. Nor has local treatment as applied by gynæcologists in the form of correction of uterine displacements, dilatation of the cervix, and similar other measures more than a very uncertain beneficial result—in most cases none at all.

In two cases which I saw and to which I was called in consultation in the 6th and 7th month of the pregnancy respectively, we succeeded by absolute deprivation of food by the mouth and by rectal feeding which was continued for 5 days to effect a cure. But whether we have in such cases to deal with a genuine reflex neurosis, as most authors suppose, or possibly with hysteria which is according to *Kaltenbach* very often the cause of the hyperemesis, must remain rather doubtful. With certainty we can say that excessive vomiting may be the result of other factors as well, f. i. diseases of the intestines, kidney, liver, peritoneum, etc., palpable changes in the uterus or finally some gastric affection which has nothing to do with the pregnancy, such as dilatation, carcinoma and so forth. Very doubtful is however the opinion expressed by *Condamin*¹ that the vomiting is the effect of a general intoxication. He treats it accordingly with subcutaneous or rectal injections of an artificial serum (?) with the stomach absolutely at rest. Whether this last element, namely the rest, is in view of my above-mentioned two cases the principal part of the treatment, is at least open to discussion and not impossible.

The most radical and only remedy is therefore the disburdening of the uterus of its contents, the embryo. Where abortion or premature labour is instituted on account of the severity of the above-discussed symptoms, it is well known that in numerous cases an improvement takes place immediately, or that the vomiting ceases altogether, and the patients make an

¹*Condamin*, Note sur un nouveau traitement des vomissements incoercibles de la grossesse. Gazette d. Hôpit. 1892. p. 161.

extraordinarily rapid recovery. This happens also where the pregnancy can be allowed to proceed uninterruptedly to its natural end, and it is often astonishing to see with what rapidity extremely emaciated women regain their normal health. For this reason it is extremely difficult to fix the period when under such circumstances the pregnancy should be interrupted. The more so, as, strange to say, the child does not suffer in the least by the great weakness of the mother, and as most extreme exhaustion or even the death of the pregnant woman is more likely to be the result than spontaneous abortion. Moreover, we must not forget that the interruption of the pregnancy in debilitated women presents new dangers, for according to a tabulation by *Cohnstein*, out of 200 cases treated by the induction of premature labour, only 40% showed immediate cure, and 18% no improvement at all. In 4% the vomiting grew worse, and 12% ended with death. At any rate, we see that hyperemesis is under all circumstances a most serious complication of pregnancy.

Vomiting may occur also during parturition; and some authors suppose this to be due to a direct and often-repeated perturbation of the stomach caused by the rising of the uterus during labour-pains. This seems to me highly doubtful, especially in view of the frequent succussions to which the stomach is subject in certain occupations, games, etc. I am more inclined to attach some importance to the general contraction of the abdominal muscles which accompanies labour pains.

Hæmatemesis has also been observed, though only very rarely. *Fellner*¹ has seen it occur in only 22 cases out of 3800 births. The cause lies probably oftenest in so-called erosions or ulcerations of the gastric mucous membrane. That severe vomiting may give rise to such injuries is by no means impossible, considering the intense violence exerted upon the gastric walls. Thus *A. Freund* has communicated to me a case not hitherto published which he has observed in a primipara 18 years old whose debility was extreme in consequence of hyperemesis. The patient died from exhaustion before it was

¹O. O. *Fellner*, l. c.

possible to institute premature labour. The post-mortem examination revealed a fairly recent ulcer of the stomach covered with a sanguineous scab and extending deeply as far as the sub-mucous-coat. The patient had when alive shown nothing more than streaks of blood in the vomit, and never vomited any large quantity of blood. How far the pregnancy *per se* exerts any causal influence on such hæmorrhages, must be left an open question; I am not aware that they ever occur during parturition.

Perforation of gastric ulcers.—*A. Freund* has seen two cases of perforation of gastric ulcers into the peritoneum, which came on quite unexpectedly and without any warning, during the first months of pregnancy. In the one case the contents of the stomach had sunk in the peritoneal cavity as low down as Douglas's pouch, so that the condition was mistaken for a hæmatoma and an operation was about to be performed. The patient died however, and the real state of affairs became apparent at the autopsy. In these cases also the causal relationship must remain doubtful. It was however unmistakable in one case which I have seen and which is fully reported in my "Klinik der Magenkrankheiten." It was the case of a lady belonging to the better classes who took for the purpose of procuring abortion several wine-glassfuls of a hot concoction made of red wine, chamomile, thuja occidentalis and other herbs, injecting afterwards into the vagina a hot mixture of soap and water. She felt unwell the whole day, could not eat anything, wanted to get up in the night and was seized with violent vomiting of blood accompanied by syncope. The cause was at the time attributed to an ulcer of the stomach, but the subsequent event and the lady's confession brought the true explanation.

Ashton reports the following case: On the 5th day after a labour completed by craniotomy profuse hæmatemesis set in, which ended fatally. The necropsy showed two ulcers in the stomach the base of which contained eroded blood-vessels. It was a case of embolism the origin of which lay in a septic affection of the genitals.

Gastritis phlegmonosa.—Puerperal fever is also said to lead sometimes to a metastatic inflammation of the walls

of the stomach (gastritis phlegmonosa) which may result in abscess (*Dietrich*).¹

Dyspeptic phenomena.—The abnormal desires of pregnant women which manifest themselves by a longing for sour, spicy articles of food, by a ravenous appetite for chalk and similar things, are too well-known to require more than passing notice; nor is it necessary to dwell at any great length on the simple dyspeptic disturbances, want of appetite amounting to a disgust at the sight of food, eructations, heart-burning, etc.² In so far as they are not caused by direct local injuries, we might classify these disorders among the reflex neuroses. Here also the above-mentioned reflex tracts are accused by several authors. *Tuszkai* sees the abdominal centres for the internal organs in the solar ganglion or the inferior hypogastric plexus respectively, which goes to the uterus on the one part, and on the other to the anterior and posterior gastric branches of the vagus.

It is certain however that pregnancy conduces also by purely mechanical agencies to disturbances in the gastric functions. Through the relaxation of the ligaments by which the abdominal organs, principally liver, kidneys and stomach, are attached there occurs in all those cases in which a return to normal conditions does not take place after parturition mainly in consequence of insufficient hygiene in child-bed, or where atrophy and flabbiness of the abdominal muscles have resulted from repeated pregnancies—there occurs in these cases a prolapse of the organs, and conditions develop which are known by the name of *Splanchnoptosis*, and which we designate according to the organ chiefly affected, as gastropptosis, hepatoptosis, enteroptosis, splenoptosis, or nephroptosis. The clinical picture arising in consequence, supplies a mixture of functional (nervous) and organic disorders which is difficult to disentangle, and

¹C. A. Ewald. Klinik der Magenkrankh. 3d edit. p. 417.

²In *Sänger's* and *v. Herff's* "Encyclopädie der Geburtshilfe," Leipzig, 1900, there is a pertinent computation in percentages of the individual articles of food; thus, for instance, the longing for sour things has been observed in 34.5 per cent. of the cases, for sweet things in 5.4 per cent., for food and fruit in 1.8 per cent. This tabulation cannot, however, be said to possess much practical value.

which we cannot attempt to discuss here in detail, as it would take us too far. It is well known that we can obtain the best results in the treatment of these affections by the mechanical appliance of suitable bandages or by operative fixation of the displaced organ, if we at the same time institute a generally strengthening hygienic-dietetic regimen directed against the neuroses.¹

Meanwhile we have somewhat deviated by these remarks from our immediate subject, namely the injuries which happen to women during pregnancy and parturition.

Gastric and intestinal catarrh.—Returning to it again, we come across pregnancies which are seriously endangered by the presence of acute gastro-intestinal catarrhs, and which lead to severe vomiting and diarrhœa. The loss of strength is so great, that a suspicion of tuberculosis of the intestines or of some other malignant disease arises, especially if convulsions and eclamptic attacks accompany the condition. *White* reports the case of a primipara who had overloaded her stomach and acquired a violent indigestion shortly before the beginning of the labour-pains. At the end of the expulsion-stage the pulse-rate fell from 80 to 48 beats. Headache and soon afterwards convulsions made their appearance. After severe vomiting, she was well again.

Hither belong also those acute inflammatory and partly diphtheritic processes of the intestinal mucous membrane, which are communicated in puerperal infections from the genitals to the lower portion of the bowels.

Chronic catarrhs of the small and large intestine are capable of determining prematurely by miscarriage a developing pregnancy. That simultaneously existing malignant new growths can influence pregnancy most unfavourably, and namely in part through the injury to the general metabolism and in part by mechanical action is self-evident. This applies particularly to cancer of the rectum which may by its extent and by encroaching upon neighbouring parts become a severe obstacle in labour.

Laceration of the intestines.—Spontaneous laceration of the bowels and of the omentum, strange as it may seem,

¹*L. Landau, Wandlerleber und Hängebauch, Berlin, 1885.*

has been several times observed during parturition. (*Stumpf, Schneider, Schäfer, L. Meissner.*)¹ In one case there had previously been peritonitis present which had given rise to adhesions between the bowels and the anterior abdominal wall. The small intestine was torn in two places. In the other cases the cause of the lacerations in the cæcum and colon remained unexplained.

It is not however pregnancy and the labour act only which favour the production of gastric and intestinal disorders. The lying-in period as well can do so. The sudden dislocation of the stomach which was before parturition compressed and pushed upwards, the rest in bed, the paresis of the intestinal tract during the puerperium predispose to disorders of digestion and to gastric and intestinal catarrhs. They are more apt to cause pyrexia than is coprostasis and are capable of producing extreme prostration.

Constipation.—Here we have to mention in the first instance persistent constipation which frequently attains most extreme degrees so that the poor women have already tried in vain the whole pharmacopœia of internal and external remedies and all the appliances of the “physico-dietetic” method of treatment by the time they come to us with their complaints!

As a consequence of chronic constipation during pregnancy and child-bed *Edleffsen*² has described an inflammation which extends round the sigmoid flexure, in other words, a perisigmoiditis or pericolitis.

For these constipations the pressure of the growing uterus upon the bowel has been made responsible,*but surely without reason, or, at any rate, with very little and only temporary justification. Because the constipation begins in many women at the commencement of the pregnancy when the above-mentioned cause is as yet unavailable, and it persists or appears even afresh after parturition when there is equally no longer any question of pressure. The probability is that the cause lies in an atony of the intestinal muscular walls which is partly nervous in origin and partly occasioned by the complex of the above-named injurious influences.

¹Compare with *C. A. Ewald*, *Klinik d. Magenkrank.* 3d edit. p. 177.

²*Edleffsen*, *Berl. klin. Wochens.* 1903. No. 48.

Herniæ.—Among the disorders of the intestinal tract which are either created or aggravated by pregnancy are included hernias. I extract the following statements from a communication by *Manley*:¹ Inguinal and femoral hernias are never caused by pregnancy, but occasionally aggravated by it. The pregnant uterus is never the cause of an incarceration. If the latter however occurs for other reasons—and pregnancy by increasing the intra-abdominal pressure favours this—the necessary operation is always followed by miscarriage or premature labour. Umbilical hernia may become greatly enlarged by repeated pregnancies or even be caused directly by them. The latter is certainly the case as regards the abdominal herniæ the production of which is very much facilitated by the atrophy of the adipose layer during pregnancy and the intensive stretching or rupture of the muscular wall during the labour pains. *Manley* reports the cure of a case of this kind in which the contents of the hernial sac consisted of omentum, and which it was possible to remove. *Kutiak* (quoted by *P. Müller*)² saw in a left inguinal hernia in the third month of the third pregnancy an inflammation of the hernial sac which ended with the formation of an anus præternaturalis. The fæcal fistula closed in the 8th month of the pregnancy and a normal parturition took place subsequently.

Should it unfortunately happen that the uterus is situated in such an old hernial sac, miscarriage or a severe obstruction to labour will most likely result necessitating a fresh operation. *Eisenhardt* describes an incarceration of the right horn of a 3 months' pregnant uterus in an inguinal hernia, *Skrivaz* an extra-uterine pregnancy also in an inguinal hernia. We must not forget to mention that according to older authors, f. i. *P. Müller*, as opposed entirely to *Manley*, pregnancy and especially repeated pregnancies supply a predisposing element in the production of herniæ. At any rate strangulation occurs very seldom during parturition and child-bed, possibly for the reason

¹*Th. Manley*. Hernia in pregnancy, and pregnancy in hernia. Medical News 1901, Jan. 27.

²Die Krank. des weibl. Körpers in ihren Wechselbez. zu den Geschlechtsfunct. Stuttgart 1888, p. 96. sq.

that the growing uterus forces the intestines into the posterior and upper portions of the abdominal cavity and the organ itself is placed, so to speak, against the door of the hernia.

Appendicitis.—An important part with respect to pregnancy and its consequences is played by the appendix vermiformis.

That pregnancy predisposes in any special way to diseases of the appendix is not known, but a previously existing appendicitis often becomes greatly aggravated during pregnancy, so that most serious accidents may happen and a comparatively light mortality may result in consequence. As far as I can see *Boye*¹ is the only one who is of the opinion that pregnancy has no particularly injurious influence on the course of appendicitis.

Fellner could find among his 3800 births only one case which showed a previous history of appendicitis and which did not exhibit any manifestations during pregnancy, while the other 3 cases which have been altogether observed, suffered severe relapses. We may mention here that the question of relationship between appendicitis and the diseases of the female sexual organs has produced an extensive literature a collection of which will be found in the gynæcological annual reports of *Fellner*, and others. From the same we gather that the intense congestion in the pelvic organs during pregnancy appears to favour in the majority of cases of existing catarrhal appendicitis the formation of para- or peri-typhlitic processes.

Possibly constipation has also an influence in that direction. But it is not in such cases always easy to make a sharp differential diagnosis between diseases of the adnexa, and those of the bowel, and many a case of appendicitis may have been confused with the above-mentioned diseases. Should a perforation of the appendix occur, it is possible, as *Fellner* says, for the high fever or the abnormally low temperature, and for the general intoxication or the collapse to produce labour-pains or to cause the death of the fœtus. According to *Boye*, miscarriage or premature labour results comparatively often even without such a

¹*Boye*, Über Appendicitis in Schw. Geb. u. Wochenbett. Mitteilungen aus der gynæcol. Klinik des Prof. *Engström*. Berlin, Karger, 1903.

severe complication. There is also a possibility that pus-bacteria may pass through the Fallopian tubes to the placenta and the child, and this is how it is that in many embryos septic processes have been found.

It is clear that the labour-act as such must be capable of causing on account of the spasmodic contractions during the pains the perforation of encapsuled exudations.

As a matter of fact, however, the perforation takes place generally in the lying-in period, after an interval of some days during which the symptoms have somewhat abated. *König*¹ tries to explain the circumstance that the perforation happens later and not during the parturition stage, by supposing that the shrinking uterus pulls so as to speak at the walls of a perityphlitic abscess and damages it so much that a spontaneous rupture occurs. On the other hand *Fellner* ascribes to the uterus prior to parturition a direct protective capacity inasmuch as it forms a reinforcement of the neighbouring abscess-wall. In fact purulent perforation of the uterine wall has occasionally been noticed, as f. i. in a case mentioned by *König*.

As to operative interference opinion is divided. *Fränkel*² recommends in the case of a simple appendicitis an expectant attitude whereas in recurring cases the operation is indicated, especially in the early months of the pregnancy. Other authors are in favour of a more active procedure. My opinion is that the same principles should be followed in these cases, independently of the pregnancy, which I have formulated with regard to the operative treatment of appendicitis in my "Klinik der Darmkrankheiten."³ They are as follows. Operation is indicated:

1. As soon as a perforation with general peritonitis has occurred, or is manifestly to be apprehended.

2. If in the course of the disease an accumulation of pus has formed under symptoms of a florid and progressive nature.

¹R. König, Appendicitis u. Geburtshilfe. *Hegar's Beiträge*, Vol. II, 1900.

²E. Fränkel, Die Append. u. ihre Bez. z. Geburtsh. u. Gynäkol. *Volkmann, Sammlung klin. Vortr.* 1901, No. 323.

³C. A. Ewald, Die Krankh. d. Darnes u. Bauchfelles. Berlin 1902, p. 258.

3. In recurrent appendicitis, which has become a source of permanent and serious danger to the patient on account of the frequency and growing severity of the attacks.

On the other hand, the fourth indication laid down in the above-quoted work, namely the presence of chronic appendicular colic and of appendicitis larvata, is hardly likely to arise in connection with pregnancy and child-bed.

Fellner thinks that in a severe attack of appendicitis occurring towards the end of gestation an operation is indicated, since there is a certainty that otherwise a serious relapse will take place, during parturition or during the puerperium which will necessitate an operation under far less unfavourable circumstances. *Boye* quotes 31 operated cases with 14 fatal results. Miscarriage ensued in 18 days after the operation, generally where the symptoms were very severe. The operative interference is therefore not to be undertaken lightly, as the prospects are in consequence of the concurrent pregnancy more unfavourable than under other circumstances.

Opinion is also not undivided on the question of the induction of premature labour. *König* considers the latter not only unnecessary but also dangerous. For if labour occurs in connection with the operation for appendicitis, this event is in many cases disastrous for the woman. This is the reason why *Marx*¹ and *McArthur* recommend the evacuation of the uterus immediately before or after the operation, but *Fellner* does not think he can advise the removal of the fœtus in the second half of the pregnancy where there is pus present, because the prognosis of the appendicitis is thereby also rendered highly unfavourable.

In conclusion it is scarcely necessary to mention that all other possible acute diseases of the intestine may supervene in the course of pregnancy. The effect of the latter upon these diseases is a very variable one. Frequently it contributes to an aggravation of their course and oftentimes again it seems to exercise no particular influence. I have repeatedly seen miscarriages occur in the course of enteric fever, while the fever

¹*Marx*, Appendicitis complicating pregnancy. American Journal of Obstet. 1889, No. 38.

itself continued its progress without any apparent interruption. In fatal cases it is of course not possible to say whether death would not have occurred had there been no concurrent pregnancy.

Changes in the adnexa and in the peritoneum.—A very important and long chapter is formed by the changes which develop in the adnexa of the uterus and in the peritoneum in connection with labour, and especially during and after the lying-in period.

As a continuation of the above-described inflammatory and purulent processes which affect the appendix and the cæcum, I may mention, to begin with, that *W. A. Freund* has described under the name of parametritis chronica atrophicans, retracting inflammatory processes which may cause in addition to other adhesions with neighbouring parts and their consequent displacement, a dragging downwards of the cæcum and appendix, a shortening of the mesentery of the latter, and therefore permanent disturbances. It is not always easy under such circumstances to find out the real state of things, and a most careful and discriminating examination is necessary in order to establish the part played by the appendix in these often vague complaints of the patients. Such cases belong to the group of diseases which I described some time ago as appendicitis larvata. It is clear that, apart from the deformities which they produce in the uterus itself if they extend lower down, or respectively backwards, upwards, to the right or to the left and if they give rise to adhesions, such inflammatory conditions and infiltrations are capable of causing not only permanent disturbances in the functions of the bowel, but also acute attacks resembling obstruction or even genuine intestinal obstruction.

Ileus.—Post-mortem we find in such cases the intestines displaced and twisted in an extraordinary manner, the omentum rolled-up and almost rope-like in appearance. Quite a number of appropriate cases are recorded in literature from which we find that the whole intestine from the duodenum down to the sigmoid flexure may be thus affected. Nothing remains then to be done but to perform laparotomy and to liberate the strangu-

lated portion of bowel from its surroundings, or to separate it from its adhesions with neighbouring parts. It is not necessary that these conditions should take place in immediate connection with the lying-in period, on the contrary they make their appearance as a rule some time later, perhaps only during a subsequent pregnancy or even afterwards. Thus *Hildebrandt* reports a case of intestinal obstruction in the 7th month which necessitated the induction of premature labour. Death ensued on the 7th day after parturition. It was found that there was a thick band going from the uterus to the omentum which had strangulated a coil of intestine.

There is also a remarkable case reported by *A. Freund* in which the ileus had arisen through a snapping-off of the transverse colon which had become adherent to the fundus uteri. A sarcoma with hydrometra had formed in the uterus which had required an operation. After the latter the uterus had sunk and thus broken off the colon adherent to it. Here also a former pregnancy had been the original cause.

Peritonitis and its consequences.—Such cases are numerous if we include among them those in which there had been puerperal sepsis and diffuse peritonitis proceeding from it. “One sees here the most variable contortions of the affected organs, so that there arise in succession manifold deviations of intestine and uterus with fixation of the adnexa, which the operating surgeon to his sorrow knows but too well, and which produce the most multifarious functional disturbances. I will mention from among them only 3 sharply characteristic types: (1) The agglutination of the fundus of Douglas’s pouch by pseudo-membranes with patency of the atrium. (2) The extension of the attaching pseudo-membranes up into the atrium so that the uterus and rectum are closely matted together, generally more so on one side than on the other. (3) The formation of fan-like bands which stretch from the fundus of the uterus to the higher parts of the rectum and to the iliac flexure. Under certain circumstances it is possible in the case of tense union between the uterus and the iliac flexure for elevation of the uterus to cause complete separation of the rectum. This condition explains the persistence of obstinate and even danger-

ous obstructions during pregnancy or during the development of tumours with elevation of the uterus."¹

It is sufficient for our purpose to have pointed out these conditions. In chronic cases or after the cessation of the acute inflammatory process there may supervene sub-paralytic conditions, meteorism, congestions in the lower abdomen, hæmorrhoids, varicose veins, and, as we hardly need mention, more or less obstinate constipation, which constitutes a source of constant complaint.

These troubles may, as we can easily imagine, be temporarily relieved by a fresh pregnancy, as the conditions in the abdominal cavity become considerably altered in consequence, approaching more nearly those which existed previous to the commencement of the injuries in question. On the other hand, the influence of pregnancy and parturition upon an intercurrent peritonitis is decidedly unfavourable. At least half the number of patients die.

Haemorrhoids. Prolapse of rectum.—Among this selection of disagreeable incidents hæmorrhoids deserve special mention. They constitute along with chronic constipation quite a prominent portion of the complaints occasioned by pregnancy and child-birth. They partly begin in the course of these processes and partly they undergo an aggravation while these processes exist. Thus hæmorrhoids situated high up may be expelled from the anus by the labour act, and may subsequently during the lying-in period produce with the retraction of the anus a strangulation with all its consequences. Ruptures and serious hæmorrhages, inflammatory swelling of the nodes accompanied by severe pain, and occasionally gangrene may supervene. In other cases the nodes appear during pregnancy or child-bed in consequence of the congestion in the abdominal circulation and of the constipation. Hither belong also the prolapsus recti and—in rare cases—the rectocele vaginalis, caused by the relaxation of the vaginal wall, conditions which may on account of the fæcal accumulation in the pouch prove occasionally an obstacle to labour.

¹W. A. Freund, Zur Anatomie, Physiologie u. Pathol. d. Douglastasche. Hegar's Beitr. Vol. II, No. 3, p. 337.

2. *Diseases of the pancreas, liver and spleen.*

Pancreas and pregnancy.—The relations between the pancreas and pregnancy are of an extremely uncertain nature.

With regard to the often-quoted case of *Haidlen*¹ in support of an acute primary pancreatitis—death of a parturient woman in the 6th week of the puerperium, no pronounced peritonitis, enlarged pancreas which was transformed into a brown-red mass suffused with blood—I am inclined to more than doubt its connection with the pregnancy or the puerperium and to regard an accidental complication as by no means impossible.

As to the secondary acute purulent inflammations of the pancreas, *Oser*² says in his well-known monograph that it is possible for metastatic abscesses to form in the pancreas in the course of pyæmia and puerperal fever, but that such cases are very rare. In the post-mortem reports of the General Hospital of Vienna for the years 1888-1898 there is not a single pertinent case.

Though we can say this much with respect to the acute diseases we are entirely in the dark in so far as the relations between the chronic inflammatory processes or new growths in the pancreas and the married state or pregnancy, etc., are concerned. That a tumour or cyst of the pancreas is occasionally met with in a pregnant woman does not prove any internal connection between the two processes.

Diseases of the liver.—The diseases of the liver have always attracted the special attention of medical men, because they lead to the most apparent and sometimes gravest changes in those organs which are not immediately connected with the generative organs proper.

Jaundice.—Not infrequently we observe in the first month of pregnancy slight jaundice which we cannot explain differently than that it is caused by a gastro-duodenal catarrh, such

¹*Haidlen*, Acute Pankreatitis im Wochenbett. Centralblatt f. Gynäkol. 1884, No. 39.

²*L. Oser*, Die Erkrank. der Pancreas. Vienna 1878, p. 161.

as we often come across. Whether this form of jaundice has any causal connection with the pregnancy must be left undecided. Should it occur during the lying-in period or later, it is possible for the bile-acids to pass into the milk, but according to *Frank*¹ not in such quantities as to do any harm to the child.

In very rare cases, however, jaundice seems to develop from an accidental and occasional occurrence into a complication recurring regularly with each subsequent pregnancy of multiparous women. *Brauer*² and *Meinhold*³ have described as hæmoglobinuria of pregnancy a clinical picture in which the two respective women exhibited at each succeeding pregnancy during the last months, lassitude, nervous irritability, pruritus, and slight jaundice as symptoms of an hæmoglobinuria.

*Brauer*⁴ has observed a further case of jaundice recurring with each pregnancy, but without hæmoglobinuria. There are a few other cases (3) in literature of the same nature. This phenomenon is said to occur frequently in Italy in the case of pregnant women suffering from malaria (*Bossi*). It is probable that the cause lies in an hæmatogenous jaundice produced by blood-poisons. (See below.) All these cases ran a benign and mild course.

Acute yellow atrophy of the liver.—Things are however totally different as regards the severe, acutely supervening and mostly fatal cases of jaundice which appear in the middle or the second half of pregnancy (icterus gravidarum gravis; puerperal acute yellow atrophy of liver). The disease begins generally with a rigor, the liver and spleen become swollen, there is severe jaundice, pains in the region of the liver which take a colicky character, hæmatemesis and melæna, eventually meteoritic distension of the abdomen. In the further

¹*F. Frank*, Untersuchungen über die Frauenmilch bei Icterus. Diss. Gießen.

²*L. Brauer*, Ueber Graviditätshämoglobinurie. Münchener med. Wochenschr. 1902. Nr. 20.

³*Meinhold*, Ein weiterer Fall von Schwangerschaftshämoglobinurie. Ibid. 1903. Nr. 4.

⁴*L. Brauer*, Ueber Graviditätsicterus. Centralb. f. Gynäkologie. 1903. Nr. 26.

course of the malady the liver grows very rapidly in volume, it becomes flabby and falls backwards so that it is covered by intestine and the liver dulness disappears.

The urine contains besides bile-pigments, also urobilin and bile-acids, and likewise albumen. Similarly leucine and tyrosine have been found present, but they are not by any means essential attributes. The disease ends fatally in the great majority of cases. Red and yellow atrophic regions alternate in the diminished liver, which presents a flabby, leathery constitution. In the yellow parts there are remains of liver-tissue, the cells of which are in a high degree of fatty degeneration, whilst the red parts consist almost entirely of connective tissue in which appear a typical interlobular bile-duct excrescences. The other parenchymatous organs, especially the kidneys show equally a more or less advanced fatty degeneration. Hæmorrhages into the serous membranes are not infrequent, as are not also bloody contents in the stomach and intestines.

The whole clinical picture which I have reproduced here in brief in order to show its septic character is undoubtedly based upon a severe infection, the starting-point of which is either the gastro-intestinal canal or the genital tract, the infection proceeding either directly from the latter or because pregnancy creates a special predisposition to the disease. That we have here nothing more than an aggravated catarrhal jaundice as *Schröder* and *Lomer* maintained, and as *Fellner* also seems inclined to admit, is altogether out of the question, although solitary cases do occasionally recover in which a doubt may arise as to whether they were severe forms of catarrhal jaundice, etc. or light forms of acute yellow atrophy. Whether we take the cause to be peculiar metabolic processes during pregnancy and the formation of so-called placental toxins (*Syncytolysin*, *Veit*) or a bacterial infection, is in view of the absence of all evidence on the point quite immaterial.

The typical cases, however, bear during the entire course of the illness such unmistakable marks of infectiousness that we cannot be much in doubt though we are as yet without proof of the existence of a specific infectious virus. It is true that *Ströbl* has demonstrated the presence of the bacterium coli

commune, and *Richard Freund*¹ that of a staphylococcus, but considering the ubiquity of these microbes, this is not of much value. On the other hand, it must not be overlooked that in consequence of pregnancy conditions are undoubtedly created which occasion changes in the circulation of the liver, and especially a slowness in the secretion of bile, swelling of the mucous membranes of the bile-ducts and of the papilla duodenalis, changes by which the entrance of microbes into the liver is facilitated. The intoxication of the blood by the admission of bile-acids and other toxins which we designate as cholæmia, favours the deleterious course of the disease. Happily acute yellow atrophy is very rare; according to *Spæth* it occurs once in 16,000, and according to *Douglas* once in 28,000 cases!

Acute yellow atrophy of the liver appears occasionally in an epidemic form without any direct connection with pregnancy, but then it would seem as if pregnant women are particularly liable to be attacked. *Charpentier* saw during an epidemic in the neighbourhood of *Roubaix* 11 pregnant women succumb to icterus gravis, and similar numbers are reported with respect to other epidemics. Whereas some writers have seen a more favourable course of the disease after the supervention of premature labour, others deny such an influence and recommend an expectant attitude since parturition does not affect the illness in any way.

Abscess of liver, fatty liver, cirrhosis of liver.

—There are also other secondary affections of the liver which may be traced directly to a puerperal infection, in contrast to the disease just mentioned in which the affection of the liver occupies the primary place of the clinical picture. Among them are abscesses of the liver, and acute fatty degenerations of the hepatic parenchyma with atrophy of the latter. Where these conditions become healed up, it is possible for connective-tissue

¹*R. Freund*, Ueber den Ausgang der akuten Leberatrophie in Cirrhose. Diss. Freiburg 1897.

Translator's note: In the *British Medical Journal* of May 2, 1896, I mentioned a very interesting case of acute yellow atrophy in connection with pregnancy, the most striking feature of which was that the disease was cured by a supervening attack of erysipelas.

proliferation to form which gives to the disease the appearance of a cirrhosis. To this group of diseases probably belongs also a fatty degeneration of the liver, kidneys and heart-muscle observed by *C. Hecker* and *Buhl* and by *Klebs*.¹ In the cases described the illness commenced during pregnancy with symptoms of an affection of the kidneys or of the heart, became graver at parturition and ended fatally during the lying-in period. Pyrexia may be absent altogether. Death may occur among signs of severe collapse or cholæmia. In the liver were found hæmorrhagic deposits arranged in groups, pronounced fattiness of the liver-cells, thrombi in the portal-vein branches which consisted of blood-platelets and degenerated or unchanged liver-cells. The causes are unknown, in any case there was no demonstrable local affection of the genitals.

We have also yet to mention hæmorrhages from the genital organs, or better said from the uterus, and from the hæmorrhoidal veins, which may take place during pregnancy co-existing with a simultaneous cirrhosis of the liver. They are characterised by the peculiar quality that they cannot be arrested by the ordinary means, and that they resemble more the œsophageal hæmorrhages which are known to us as complications of cirrhosis of the liver. The reason is that the veins belonging to the uterus and vagina terminate in the middle and superior hæmorrhoidal veins, which in their turn form together with the colic veins the inferior mesenteric vein, which again terminates in the splenic vein, a branch of the portal vein. Every congestion in the portal system, that is, every obstacle which the flow of the portal-vein blood meets within the liver reacts on these veins, the more so as pregnancy alone causes to begin with congestive conditions in the abdomen. The result is a dilatation and rupture of the minute and delicate blood-vessels, and the above-mentioned hæmorrhages.

Gall Stones.—Pregnancy has always been looked upon as a predisposing factor in the origin of gall-stones. Statistics show that in a considerable number of cases the first symptoms

¹*Klebs*, Multiple Leberzellenthrombose, ein Beitrag zur Entstehung schwerer Krankheitszustände in der Gravidität. *Ziegler's Beiträge* Bd. 3 Heft 1.

of the illness appeared during or immediately after child-bed. Thus *Cyr* found among 51 cases of gall-stones 22 with such a history. *Naunyn*, *Huchard* and others express a similar opinion. *Naunyn* says that of 115 cadavers of adult women, containing gall-stones, only 10 had not gone through any pregnancies. It is evident that the above-mentioned influences of pregnancy on the circulation in the liver favour the formation of gall-stones; the same thing applies to the displacements of the liver which appear as consequences of parturition. That the calculi become mobile during pregnancy and during the labour act, that they occasion colics, and that they eventually escape, is nothing remarkable. The direct connection cannot therefore always be demonstrated with certainty.

So as to exhaust completely the list of diseases of the liver there remains only to be mentioned in conclusion that cancer of the liver generally takes during pregnancy a particularly rapid course, that it leads to extreme cachexia of the women and that it accelerates the fatal issue.

Spleen.—The relations of the spleen to the processes which interest us here do not really belong to the chapter on "Diseases of the organs of digestion in relation to marriage," but it is not unadvisable to enumerate them briefly on this occasion. There are only two or three changed conditions affecting this organ. They are: the enlargement of the spleen which is one of the symptoms of a general septic infection, and the rupture of the capsule or of the spleen itself with consequent hæmorrhage into the abdominal cavity, which has been several times observed in connection with pregnancy and parturition. According to *I. Y. Simpson* the soft consistence of the spleen is likely to predispose to rupture of the capsule, a supposition with which we cannot agree, because the capsule is firmer and tenser than the soft pulp, and because the reported cases have shown an acute rupture and not a previous disease of the spleen which might have predisposed to a friability of the organ. Neither was the cause of the rupture clear in the frequently quoted case of *P. Müller*—death from ruptured aneurysm of the splenic artery 3 hours after parturition.

That the spleen, like the kidneys, etc. may become loose in

its ligamentous apparatus and acquire an abnormal mobility which permits it to take up a position in the diaphragmatic excavation more or less distant from its normal situation, in other words that the organ may become a so-called "wandering spleen"—is a subject belonging to the above-considered chapter dealing with the prolapse of the abdominal organs, and only requires here passing notice.

Favourable Influence of Marriage, as Regards the Wife.

In attempting now to describe the advantages accruing to the wife from the married state, as against the long and sad list of diseases enumerated in the first part of this chapter, we must admit to our sorrow that there is very little to say. This does not of course mean that the benefit which the wife derives from marriage—with reference to the organs of digestion—is correspondingly small and that the above enumeration of the ills and woes to which she is liable constitutes the regular state of affairs; nor does it mean that marriage is an institution against which we must warn in any case.

The fact is that the above-described conditions are exceptions only—although some of them have almost become the rule—and that the vast majority of women do not fare so badly! How many anæmic, chlorotic, and nervous young girls who were before their marriage subject to all kinds of digestive troubles develop during married life into strong and healthy women with an excellent appetite and perfectly normal functions of all the organs concerned. In fact, even severe constitutional diseases may disappear or not come to development where there is an hereditary predisposition to them, provided of course that the digestive organs do not suffer and that they exercise their functions properly. There is in this connection in *W. A. Freund's* "*Gynaecologische Klinik*"¹ a most interesting and per-

¹*W. A. Freund, Gynaek. Klinik, Strassburg 1885, p. 353.*

haps not sufficiently known example. Considering the importance of the subject I will reproduce the same in the author's own words:

"The wife of a medical friend is descended from a tuberculously predisposed family. Her mother had died when between 30 and 40 years old from pulmonary tuberculosis and likewise her oldest sister after a short sterile married life. She herself was 19 years old when she married, delicate, tall in stature, with narrow chest and troubled with a severe cough. She gave birth at intervals of about 2 years to 5 children each of which she suckled for about 6-9 months. I have seen this lady during all this time growing, if I may say so, stronger and healthier; she developed into a model of robustness, and is at the present day as a matron 50 years of age one of the most handsome women in the neighbourhood where she lives. After the death of the above-mentioned eldest sister the widower proposed marriage to a third sister living under the roof of my friend, her brother-in-law. The girl was alarmingly delicate, had had a cough for many years, and hæmoptysis several times. The apex of the left lung showed signs of consolidation.

"My friend and I had a consultation over the matter and we decided to inform the would-be husband of the real state of affairs and to oppose the marriage strenuously. Fortunately for him and for the girl the gallant and enamoured officer pooh-poohed our warning, and we experienced in the young married woman the same pleasant surprise as in her elder sister. She gave birth in fairly rapid succession to 3 children whom she suckled, and all the while she became steadily stronger and more vigorous so that she is considered to-day one of the healthiest women of her acquaintance. Both sisters, the elder one now in the fifties and the younger one in the forties have survived their husbands who were both in very good health. According to our modern terminology both have so far altered the state of their organism that they no longer offer any suitable soil for the growth of the tubercle-bacillus. For the better understanding of these experiences, it is necessary to add that the first-mentioned wife of my medical friend lost a boy one year old with symptoms of meningitis and her eldest daughter at

the age of 20 from pulmonary tuberculosis about 4 months after her first confinement."

Such experiences would not be possible without the favourable influence which married life can exert on the general state of nutrition, that is, on the metabolic processes of the female organism. We do not refer here to the above-mentioned more or less diseased individuals, but to those delicate and fragile creatures who develop during the married state into robust, resistant and "embonpoint" women. There are plenty of instances though they naturally find no place in gynæcological text-books.

*Influence of Diseases of the Digestive Apparatus on the
Contraction of Marriages.*

The question is to be discussed, finally, whether one of the above-considered diseases of the digestive organs (including the liver and spleen) may form a reason for prohibiting a contemplated marriage or for advising against it. Of course only a portion of these diseases may give rise to such considerations. Because persons with pronounced cancer of the liver or of the stomach, persons afflicted with cancer or manifest tuberculosis of the intestines or who are strongly suspected of being thus afflicted, persons with pernicious anæmia, severe chronic dysentery or similar affections must not only be dissuaded from marrying, but actually and directly forbidden, where this is at all possible.

A great deal certainly depends upon circumstances, and we may well imagine cases where such marriages can take place with the consent of both parties, always provided that neither of them is in the dark as to the true state of things. Regard for the offspring must in such cases also play an important part. Where there is a possibility of children being born to a father or mother suffering from an hereditary disease, marriage is a priori out of the question, at least theoretically,

but in most such diseased conditions there is to begin with a physical incapacity which precludes the possibility of conception. Generally speaking these cases cannot be decided by fixed rules but each one must be considered on its merits and with a full appreciation of all the factors concerned.

It is different as regards the other diseases considered above but they can only interest us in this connection if they were acquired previously to marriage.

That the married state can be nothing but beneficial to the great majority of these conditions we have already mentioned with respect both to men and women, and there remain only a few special cases. The greatest apprehension will probably be caused by a manifest disease of the appendix, a condition which occurs most often just at the age when marriages are commonly entered into. After what we have said above on the influence of pregnancy on the course of appendicitis and vice-versa on the effect which diseases of the appendix exercise upon gestation, we should consider it advisable to recommend if possible the removal of the appendix before the consummation of the marriage, especially in those cases where the appendicitis has been a recurrent one and where the danger of a relapse during married life is therefore particularly great. Whether the patients concerned will, especially in the milder cases, accept this advice is of course another question. This applies to even a greater extent in the case of gall-stones, an affection which is hardly likely ever to assume such serious proportions as to render it an insurmountable obstacle to matrimony. Lighter cases certainly offer no sufficient reason for dissuading from marriage, and in the severer ones the operation spontaneously becomes such a prominent necessity that it is bound to be carried out before the contraction of marriage almost in the natural course of events.

Matters are not much different in ulcer of the stomach. We often see in our consulting-rooms patients who desire to be cured of a manifest *ulcus ventriculi*, or of complaints which suggest more or less forcibly the existence of that affection, in time to get married, if possible on the date fixed beforehand as the wedding-day. That such, and let us add, similar other,

diseases and complaints are no obstacles to marriage is clear. If at all indicated, it is advisable to recommend in such cases a postponement of the marriage, but a long experience has taught me not to expect that this recommendation will be listened to, salutary though it is. The parties concerned prefer to take the risk in the hope, which is indeed often justified, that marriage will bring along with it the necessary care and attention.

XIII

Diseases of the Kidneys in Relation to Marriage

XIII

DISEASES OF THE KIDNEYS IN RELATION TO MARRIAGE

By **P. F. Richter, M.D.** (Berlin)

The kidneys occupy a most prominent position among the organs the condition of which is of the highest importance with regard to the contraction of marriage, and which are on the one hand subject to considerable influence from the married state and on the other hand of material import to the married couple as well as to their offspring. To begin with, the close spacial relations existing between the urinary and the genital organs both in the male and female sexes point to the possibility of reciprocal influence between them through the medium of sexual intercourse. Moreover in the female, pregnancy and parturition cause, particularly to the kidneys, an increased amount of work, and there is also no doubt that an organ of such physiological importance as the kidney which makes itself felt over the entire organism even under normal circumstances, must necessarily play an even greater rôle when it is subject to disease.

In considering the reciprocal influences which marriage and renal disease exercise upon one another, it cannot be our object to examine these relations in detail with respect to every single disease of the kidneys. For, apart from the circumstance that such an examination with its inevitable repetitions would prove tiresome, a number of renal diseases are so rare that they hardly deserve to be included in an article intended in the first instance for the general practitioner. It must rather be our aim to single out those groups of diseases which are on the one hand of importance on account of their frequency in general practice,

and on the other so analogous in their manner of influencing the activity of the kidneys that they may be discussed under one head, in spite of their individual differences.

Nephritis.

The medical practitioner who is asked for his opinion whether in the presence of nephritis in one or the other of the parties contemplating marriage—for it is hardly necessary to dwell at any great length upon the fact that it is in the nature of things principally chronic and not acute diseases which will confront us in this connection—such marriage is permissible, must first ask himself upon what factors the diagnosis of nephritis is based, and whether this diagnosis is at all justified. An examination of the urine for albumen simply is in any case not sufficient. Since we know that there is a so-called physiological albuminuria, that is, that under certain circumstances an albuminuria may exist for many years without doing any injury to the general health and without producing any demonstrable anatomical changes, and since it is a fact that those who are subject to this condition may reach the allotted span of life, it would be perfectly unreasonable to condemn an individual to celibacy simply because of this existing albuminuria. It is true that there may be very great difficulty in deciding in individual cases whether the albuminuria is physiological or not, and in view of the enormous importance of the subject and of the great responsibility arising to the physician from an answer in the affirmative we must consider this point somewhat minutely.

Differential diagnosis between nephritis and physiological albuminuria.—The first essential is the principle upon which *Senator* particularly has always insisted, namely that physiological albuminuria cannot and must not be diagnosed from a single examination of the urine or even after a short observation only. Most calamitous mistakes through the confusion of insidious nephritis with intermittent albuminuria and without effect upon the general state of health

as without prominent symptoms are apt to occur if this principle is neglected.

For the avoidance of such mistakes we have a number of guiding factors referring above all to the condition of the urine. It is not either the quantity of urine or the quantity of albumen excreted which comes into consideration, although the latter does so in one particular direction, since very considerable quantities of albumen may be said to exclude with absolute certainty the presence of a physiological albuminuria. A small quantity of albumen on the other hand, say under 0.5%, is not necessarily harmless because we often come across cases of chronic nephritis in which the amount of albumen in the urine continues for years to be so trifling that it can only be detected by the most delicate testing methods.

More important than the amount is the course of the secretion of albumen. Constant albuminurias even if they are of an insignificant nature are probably never reckoned among the physiological ones. The type of the latter is rather the intermittent variety, observed occasionally in chronic nephritis as well, which is particularly characteristic in those cases where definite irritations of the daily life lying within the borders of physiological conditions bring the albuminuria into existence, where with their disappearance the albuminuria also disappears and where in their absence no albuminuria occurs. Among these physiological factors which favour the passage of albumen into the urine in individuals specially predisposed to it, is to be reckoned in the first place fatiguing physical exercise, which is associated with intense muscular activity, sometimes only the standing posture; further, irritations from the sensory sphere such as psychical emotions and mental exertions, and finally cold baths and food rich in albumen.

Where in addition to the albumen the urine contains abnormal constituents, principally leucocytes which do not come from the urinary organs, and casts, even in very minute quantities, the diagnosis of physiological albuminuria is absolutely out of the question. The only exception is formed by the presence of isolated hyaline casts which have occasionally been observed along with the albumen and also without the latter

in the urine of healthy people (Cylindruria). Nevertheless the occurrence of more than a few isolated specimens of this kind will cause the careful physician to be on his guard, and induce him to suspect a different pathological origin even where there are other elements pointing to a physiological albuminuria, and this suspicion will become a certainty if there are also found leucocytes (mostly mono-unclear) or other cellular elements as signs of a renal affection.

The most important point however is the attitude and constitution of the individual concerned. Only in the case of younger people in their best years and in full vigour, without subjective and objective signs of disease, especially of the organs of circulation, is it permissible to regard an albuminuria to which the above remarks apply as a comparatively unimportant symptom. An albuminuria ensuing the other side of the third decade should never be classed as a physiological one, but must always create a suspicion that there is an insidious renal affection present, even though all other symptoms are absent.

Albuminuria of puberty.—If it is therefore necessary for the physician to be careful in the interpretation of albuminuria in the case of somewhat older candidates for marriage and to express an opinion with a certain amount of reservation only, this cautiousness is none the less indicated in those cases where we are in the presence of the so-called albuminuria of puberty which affects younger individuals. As is well-known this is an occurrence which we meet in overgrown and ill-developed persons, mostly chlorotic girls, who exhibit all kinds of symptoms generally associated with chlorosis, such as a pale complexion, a tendency to tire easily, gastric disturbances, headache, etc. Upon examining the urine incidentally albumen is found to be present. This happens as a rule intermittently, especially in connection with the urine passed during the day; the condition grows worse under the influence of the factors enumerated above, particularly the muscular exertions; the albumen is absent in the night-urine and diminishes also in the day-time or disappears even altogether when the patient takes a rest in bed.

Under no circumstances must this kind of albuminuria be regarded as a perfectly harmless one. In the majority of cases it depends probably upon a poor constitution of the blood with light forms of cardiac insufficiency, the heart not being as yet fully equal to the greater demands made upon it on the part of the rapidly growing organism. With the improvement in the anæmia and the gradual increase in the activity of the heart the albuminuria may disappear permanently.

There are however sufficient observations known where the albuminuria of puberty formed the starting-point or rather the first manifestation of an insidious nephritis and where the pronounced complex of symptoms of chronic nephritis developed fully after many years without any other cause.

Just because as already mentioned it is chiefly young girls who exhibit such albuminurias the acquiescence in the contraction of marriage involves in such cases a certain responsibility on the part of the medical attendant. Pregnancy and labour impose such a considerable task on even healthy kidneys, that kidneys whose parenchyma is without doubt on account of deficient circulation and bad nutrition less capable to resist unusual irritation than under normal circumstances appear indeed to be in danger; nor is it by any means impossible for this condition to grow into a genuine nephritis in the course of one or several pregnancies. At any rate the physician will endeavour, before the marriage is consummated, to bring the albuminuria to an end by the employment of the usual therapeutic remedies, such as iron preparations, stimulation of the activity of the heart, and similar other measures. On the other hand it is not necessary in such cases to look upon the situation with too much pessimism but to recollect that frequently where all these remedies fail, marriage acts as a real cure of the chlorosis and consequently of the principal cause of the albuminuria. (See chapter on chlorosis for further details.)

We could do no more on this occasion than point out in brief the factors which help us to decide the question whether in any given case of albuminuria we have before us an undoubted chronic nephritis or a comparatively less serious disturbance in the health of the individual concerned. At any rate it must

be emphasized how difficult the diagnosis may be in any single case and that it can only be arrived at after a most minute consideration of the various circumstances, and after a prolonged period of observation. For this reason there is no one better qualified to express a definite opinion on the point than the family doctor who has known and observed the candidate for marriage perhaps from childhood or at any rate for some time, and who is perfectly familiar with his or her early life, previous diseases, constitution and other such momentous details. It is hardly necessary in view of what has been said above, to enlarge on the importance of this first-hand information. That mistakes are apt to occur in spite of most careful observations is proved by the statistics of physicians to life-insurance offices. Thus *Washbourn* has seen of 39 insured with supposed "physiological albuminuria" only about half the number reach the normal average duration of life. And even *Leube* who has more than anyone else pointed out the comparative frequency of albuminuria in otherwise healthy individuals admits that he has in the course of time become more careful in excluding nephritis in apparently harmless cases of albuminuria. At any rate there will always be cases where the physician consulted will be in a position to assure the person contemplating matrimony that his or her albuminuria is to all appearances of no consequence and that it does not constitute an obstacle to contraction of marriage, although it may act as a warning to be careful about the mode of life to be adopted. This optimistic view of the situation is often thoroughly confirmed by the further course of the individual's married life.

By far the preponderating majority of cases of albuminuria, however, depend upon chronic nephritis, and we have now to consider the influence of marriage upon the course of inflammation of the kidneys, and in this connection to examine carefully into the question whether and under what circumstances the contraction of marriage may be permitted from the medical standpoint in the presence of nephritis in the one or the other party.

It is in the first instance necessary to remember—and this is a point which applies equally to both sexes—that chronic

nephritis *per se*, that is without regard to the married state, shortens materially the duration of life. It is true that we no longer estimate the probable life-duration of nephritic patients with such pessimism as was done by older generations of medical men who frequently did not diagnose the disease until it had reached its final stages. We know that patients with so-called cirrhotic kidney can from the perfectly insidious beginning onwards live and follow their occupations comparatively free from symptoms and complaints for as long as 20 years and more. But opposed to this relatively prolonged and favourable course of the disease with more or less extended intervals of remission we have as the other side of the picture what we may fairly call the absolute incurability of the malady.

The influence of the married state upon the course and duration of the illness does not manifest itself similarly in men and women and it is therefore requisite to consider it separately with respect to each of the two sexes.

Influence of marriage on the chronic nephritis of the husband.—Married life does not appear to possess any elements which act aggravatingly upon the nephritis of the husband. No doubt every physician has not infrequently opportunities to observe in men cases of nephritis which have hitherto remained latent and unrecognised and which assume soon after marriage a rapid character leading to a fatal issue in a comparatively short time. It is certainly possible that this rapid course is rendered still more so in consequence of the reproaches which the patient makes himself, since we know from experience that psychical emotions influence nephritis most injuriously. Generally speaking however it is not the married state as such which is accountable for the aggravation, but external contingent circumstances. Where the struggle for the daily bread makes life harder, where the husband in order to maintain his family has to perform a greater amount of work after his marriage than he did when he was single, the nephritis is sure to find a suitable soil for further and rapid development, especially if there is no possibility for the struggling and afflicted patient to take care of himself or to obtain the proper nursing.

Where the outward circumstances are however favourable, where the necessary comforts of life can easily be obtained, where exacting employment can be avoided, where it is possible to seek in the winter a refuge in suitable southern climates and where similar other luxuries can be indulged in; further, where a regulated mode of life does not offer opportunities for excesses of any kind, and where the nutrition is wholesome and less irritating for the kidneys than the restaurant-food of bachelors generally is—under these circumstances the renal affection is more likely to be influenced beneficially and the married state more likely to prove life-prolonging.

As to the character of the married life, and especially with regard to the gratification of the sexual activity and the possibility of propagation, it is certainly true, that chronic nephritis is in so far injurious as it is reckoned among those diseases which lead in the course of time to a diminution of the virile power. This influence must not however be exaggerated. In the far-advanced stages, when cachexia is well-marked, when all vegetative functions are at a standstill, when the unhappy and exhausted patients are but the shadows of their former selves, complete absence of the sexual desire is the rule. But on the other hand experience tells that during the latent stages which may last for years and even decades and in the course of which the disease manifests itself by traces of albumen only, there is generally no pronounced impotence such as would attract the attention of the patients, and they are capable of doing full justice to their marital obligations. There are certainly exceptions to this rule. *Bartels* as well as *Fürbringer* point out that a “mysterious” diminution of the *facultas cœundi* occurs sometimes at a very early stage of chronic interstitial nephritis.

Influence of marriage on the nephritis of the wife.—Of far greater importance than in men, are the relations between marriage and nephritis in women, since pregnancy and childbirth,—particularly the former—exert a most complicated influence upon the activity of the kidneys and its disturbances. The effect of the married state upon the nephritis of the wife is, to begin with,—and this applies equally to all

the other diseases of the kidneys, of which we shall speak later on—far more lasting and fateful than upon that of the husband. For this reason it is also easy to understand how it is that, whereas casuistic contributions to the subject “marriage and nephritis” in regard to man are very rare and deal at the utmost with a diminution in the virile power, the same question with regard to woman is represented in literature by a considerable number of cases recording the influence of pregnancy, parturition and child-bed upon diseases of the kidneys of which nephritis is by far the most prominent. The most recent comprehensive work dealing with the subject, that of *Fellner*, mentions no less than 740 publications which are more or less connected with this question, though most of these are written more from the point of view of the gynæcologist and obstetrician than from that of the family practitioner. We must to a certain extent agree with *Fellner* when he points to the contradiction that in spite of the voluminous appreciation of the subject in the specialist gynæcological literature most recent contributions on nephritis omit either all reference to the influence of renal diseases in connection with pregnancy and *vice-versâ* that of pregnancy in relation to existing renal disease, or mention it only very briefly.

In discussing this influence—as already mentioned pregnancy occupies in this connection the foremost place whilst labour and child-bed are only of secondary importance—we must keep the two following points apart from one another: 1. Renal disease in association with or as a consequence of pregnancy. 2. Pregnancy in association with previously existing renal disease. It will be our aim to show that we have here two prognostically different conditions which vary also with regard to the dangers which they occasion to the mother and the offspring.

Nephritis of pregnancy.—1. As regards the renal disorders which are dependent on pregnancy as such it is usual to call them by the name of “nephritis of pregnancy.” We understand by the same an affection of the kidneys arising during pregnancy, usually in its latter months, in persons who have never previously suffered from any disturbances in the domain

of the urinary organs. Diagnostically it is not always easy to differentiate the condition from simple congestion, and in going through the literature of the subject one frequently meets cases quoted as nephritis which do not really belong to this classification. The urine is rich in albumen, contains numerous abnormal constituents, casts, leucocytes, fatty renal epithelium; the appearance and concentration of the urine may be variable; sometimes it is pale and copious with a low specific gravity, sometimes especially in consequence of co-existent congestion, of high specific gravity and scanty. In addition, there exist other signs, more or less pronounced, of acute nephritis: œdema, dropsy, not infrequently retinitis, and finally eclampsia.

The origin of the affection is by no means clear; clear is only its relation to pregnancy. But in what manner the latter creates the nephritis—on this point opinion is very much divided. Some authors suppose it is due to a pressure-congestion; some assume a parasitic nephritis. According to *v. Leyden* there is no direct inflammatory process, but only an anæmia of the kidneys with fatty degeneration. *Senator* agrees with those authors who attribute the injury to the kidneys to a retention of poisonous substances in the blood, a toxæmia resulting from deficient renal activity. The causation would therefore lie in an insufficient “detoxication” of the body, and such a condition is in fact more likely to arise during pregnancy than at other times, partly on account of the considerably increased work thrown upon the kidneys, partly in consequence of mechanical pressure and encroachment of space in the abdomen by the pregnant uterus, and partly in consequence of a greater production of toxic substances in the general metabolism of the pregnant woman.

More important than the points of view indicated above with regard to the pathogenesis are for practical reasons the following questions:

1) What is the frequency of the condition designated as nephritis of pregnancy?

2) Is there in the condition of the kidneys preceding the pregnancy an element which predisposes to nephritis, in other words, can the latter be foretold beforehand or can its supervision be prevented in any way?

3) Which are the dangers arising to the mother from the nephritis?

4) How can we, as far as is possible, circumvent these dangers?

1) The frequency of nephritis in pregnancy is not a very great one. The different statistics vary somewhat from each other, but nevertheless it does not exceed 10%. Thus *Mynlieff* gives 245 cases "with albuminuria" out of 3536 pregnant women. *Fischer* finds only 7.4%. We mention these two authors as examples merely. From none of the statistics however does it appear definitely whether they always refer to genuine nephritis of pregnancy only, and whether simple cases of congestion are not included.

2) As to predisposing moments which are of importance for the origin of gestation-nephritis we know next to nothing. Most authors endeavour to get over the difficulty by the supposition of a "deterioration" of the kidneys which causes them to respond much more intensively to the retained toxic substances than healthy organs. If, to begin with, there is in addition to this deterioration a certain inefficiency in the excreting capacity, the result is naturally a constantly increasing overloading of the blood with effete material, thus creating a proper vicious circle. These are however so far but mere suppositions without a definite clinical or experimental basis. It ought to be demonstrated in the first instance whether women with "physiological" albuminuria or women exhibiting the higher degrees of renal injury which we have considered under the heading of "albuminuria of puberty" are more apt to suffer from pregnancy-nephritis than other women. As far as I know there are no observations in that direction which might be of assistance to the practitioner in arriving at a decision.

It is nevertheless advisable in such cases to be careful with the prognosis, and if not exactly to oppose the marriage, at least to call attention to a possible complication of pregnancy with nephritis. It will also be the duty of the medical attendant to watch the woman in question most attentively, and to satisfy himself by repeated examinations of the urine as to the state of the kidneys, so as to be able to take immediately the neces-

sary steps and to recommend the necessary conduct as soon as the first symptoms of a disordered renal activity make their appearance.

Transition of pregnancy-nephritis into chronic nephritis.—3) Among the dangers resulting to the mother from the nephritis of pregnancy we have to consider in the first place the question whether a temporary condition existing during the time of pregnancy and disappearing with its conclusion may pass into a permanent renal affection, *i. e.*, a chronic nephritis, and whether such a transition occurs frequently, if it occurs at all?

The answer to these questions varies. According to some authors (*Fehling, Flaischlen, Freyhan, Hahn, Löhlein, Studer*, and others) the danger of such a transition does not exist at all, or else to such an insignificant extent that it is not of any practical importance. In their opinion the nephritis of pregnancy has always a tendency to heal; but sometimes, though rarely, the condition is apt to return with subsequent pregnancies. *Hofmeier* also, contrary to his own former opinion, is now on the side of those who consider the transition into chronic nephritis as at least not proved, and who rightly miss in the statistics which answer the question in the affirmative at the hand of figures, positive evidence that the women concerned were as a matter of fact previously in the possession of perfectly healthy kidneys. For this reason such statistics as that of *Koblanck* which gives 6.5% as the frequency of the occurrence of chronic nephritis after pregnancy-nephritis, are not quite without faults. For they omit to give the state of the patients before their first pregnancy. Besides, hospital material upon which these figures are based is altogether the least suitable for the purpose, seeing that it consists of a class of people who are not in a position to look after themselves very carefully, who do not often undergo medical examination and in whom a chronic nephritis is more likely to be overlooked than among the better classes who are constantly under the medical supervision of their family attendants.

But although numerical evidence as to the frequency with which chronic nephritis develops from the nephritis of preg-

nancy is not obtainable, there can be no doubt as to the possibility of such an occurrence. This is proved by cases reported by *v. Leyden*, *Weinbaum* and *Herrlich*, which were observed in Prof. *v. Leyden's* clinic; further by *Krzyminski*, *Puech*, *Westerode* and others.

Under what circumstances this transition takes place, what factors favour its occurrence, are points which the clinical observations do not show at all clearly; neither can we derive any information from anamnestic data, nor is, as *Koblanck* truly observes, the beginning and duration of the renal trouble at all characteristic so as to be of any help. In spite of a long duration of the albuminuria in pregnancy-nephritis it is possible for chronic nephritis to remain absent; on the other hand it may make its appearance subsequently during a comparatively favourable and harmless course of the former, as has been shown by isolated observations, so that it is never possible to say beforehand with certainty what is going to happen. At any rate even if we cannot at all share the view of those authors who look upon pregnancy-nephritis as a relatively harmless renal disorder which does not leave behind any evil consequences, we can at least derive a certain amount of comfort from the reflection that it but rarely passes into chronic nephritis.

Nor is the danger of a relapse of pregnancy-nephritis during subsequent pregnancies very great. It does happen—such cases have been recorded by *Fehling*, *Flaischlen* and others—that pregnancy-nephritis occurs in one and the same multipara several times without the kidneys showing any abnormal function during the intervals and without, judging at least from observations made hitherto, the development of a chronic renal inflammatory condition. But on the whole the repeated occurrence of pregnancy-nephritis is not frequent. *Fellner* could find among the large material of Prof. *Schauta's* clinic only 4 such cases. As a rule pregnancy-nephritis occurs in the first pregnancy only, and is absent in the subsequent ones, partly in consequence of hypertrophy of the heart becoming more and more established with every pregnancy, partly, as some believe on account of the kidneys getting gradually accustomed to the

toxins forming in the pregnant organism, and partly also because the intra-abdominal crowded condition becomes less and less pronounced with every fresh gestation.

Of serious dangers to the mother must in the first instance be mentioned *eclampsia*; it threatens the life of patients affected with pregnancy-nephritis to a not inconsiderable extent. *Fehling* has computed this to amount to 5%. In addition the premature separation of the placenta has been repeatedly observed in association with a strong tendency to hæmorrhages. As to the dangers arising to the fœtus in consequence of this we shall have something to say later on. Finally, *affections of the retina* are not infrequently an undesirable complication.

The combating of the dangers in pregnancy-nephritis.—4) With regard to the successful combating of the dangers connected with the nephritis of pregnancy, opinion is in so far divided that the question arises whether the interruption of the pregnancy is indicated and particularly at what stage this operation should be undertaken. The majority of authors are of the opinion that we should at first for some time try the ordinary therapeutic treatment of nephritis especially the hygienic-dietetic part of it, and to see whether an improvement can thus be effected. If this is not the case, if the nephritic symptoms get worse, if the œdema and dropsy increase, if dyspnœa, headache, and other nervous phenomena make their appearance, and if the activity of the heart is inefficient, the induction of premature labour becomes fully justified. In the case of the above-mentioned complications, especially in eclampsia, artificial detachment of the placenta, and retinitis albuminurica, the operative interruption of the pregnancy must be effected as soon as possible. In retinitis, because the affections of the retina during pregnancy-nephritis offer the best prognosis, if the pregnancy is quickly determined. A complete restitutio ad integrum is then soonest to be expected. Even where the acuteness of vision is only moderately diminished the immediate induction of premature labour is indicated. (*Silex*.)

It must not however be concealed that more radical views than the above have also been expressed and that they also have their supporters. Thus for instance *Jarret* recommends the

immediate induction of premature labour under all circumstances; he refuses to wait until the 7th month, that is up to the time when the foetus is viable, on account of the supposed bad prognosis of the child's life and because of the dangers which a prolonged continuation of the albuminuria is likely to cause to the mother. Some German authors also take up the standpoint that the induction of the premature labour without waiting for any length of time is indicated if the pregnancy-nephritis leads already to symptoms in the first half of the pregnancy.

We must of course ask ourselves: Is there any chance of diminishing or removing entirely the dangers threatening the life of the mother, at least in so far as simple uncomplicated nephritis is concerned, by means of this more active interference? For, as regards eclampsia and similar immediately dangerous complications there can be no two opinions. Even authors like *v. Leyden* who incline to the view that the longer albuminuria lasts the more its dangers grow, admit that we have absolutely no criteria by which we can judge whether we may hope for its disappearance after a certain time or on the other hand fear its prolonged continuation. The indications for the premature labour or for the time of its induction are therefore quite uncertain. And just as uncertain is the desired result.

Besides, the interruption of the pregnancy is by no means an absolutely safe procedure. *Kleinwächter* and *Schauta* are right in pointing out that the existing dangers are not immediately removed by the induction of premature labour and that on the contrary greater ones may sometimes be created, seeing that the labour process in itself supplies a fresh complicating factor. "The difference between the point of view of the internal clinician and that of the gynecologist is that the former devotes special attention to pregnancy in its evil effect upon an existing internal disease, whilst the latter takes into consideration the rock of parturition as well." (*Schauta*.)

The opinion of *Schauta*, expressed in the lecture from which these sentences are extracted, to the effect that "most ailments are overrated in their importance with regard to pregnancy" may

apply perhaps, as can be judged from what has been said above, to nephritis which supervenes in the course of pregnancy, but not to pregnancy associated with a previously existing nephritis. Chronic nephritis with which we desire to deal now is most unfavourably influenced by pregnancy in by far the preponderating number of cases. (*Dickinson, Möricke, Carpentier, v. Leyden, Weinbaum, Mynlieff, Hofmeier, Fehling, and others.*) And it is chiefly two factors which are accountable for this: firstly the circulatory disturbances caused by the pregnancy which throw more work upon the kidneys and influence injuriously the compensation between the heart and the kidneys, and secondly the direct damage to the renal parenchyma produced by chemical noxæ. If, as we have seen while considering the nephritis of pregnancy, the metabolic products formed in the pregnant organism are capable of injuring a healthy kidney or at least one which is in a certain weak condition of equilibrium, how much more likely is it that they will act deleteriously upon one already diseased and inflammatorily altered? As a matter of fact we do not infrequently observe that renal disturbances which have apparently become healed, and latent processes which gave rise to no symptoms, break out afresh during pregnancy and assume an active character: the hitherto slight albuminuria increases in severity; the urine contains a more or less abundant accession of epithelial cells and casts; œdemata appear, the organs of circulation are affected, the general condition becomes worse; in brief the nephritis which had hitherto remained almost unnoticed or at any rate been going on without injuring the health, experiences a rapid exacerbation so that it is capable under symptoms of cardiac debility or of uræmia and eclampsia to lead to a fatal issue at the very first pregnancy.

In the whole course and in the clinical aspect of the chronic nephritis which recrudesces during pregnancy there is a great difference noticeable as against the nephritis of pregnancy. The symptoms do not appear as late as the second half of the pregnancy but frequently much earlier; they can assume an alarming character and quickly cause imminent danger to life. I append here as examples a few instructive cases out of the casuistic literature on the subject.

1. Case of *Mynlieff*: Woman, formerly acute nephritis, cured with the exception of a few remaining symptoms, becomes pregnant. During the pregnancy increase in the hitherto small quantity of albumen in the urine. The latter contains numbers of hyaline casts and epithelial cells. Œdemata. Retinitis albuminurica. Birth of a macerated fœtus. Three months later death.

2. Case of *Löhlein*. (Transition of pregnancy-nephritis into chronic nephritis.) A woman, thirty years of age is taken ill in the 7th month of her 7th pregnancy with nephritic symptoms. Artificial premature labour. Material improvement, but no complete subsidence of the nephritis. One year later fresh pregnancy. In the 5th month uræmic attack. Death.

3. Case of *Pawlinoff*: Woman, 21 years old. At the age of 13 diphtheria with paralysis of the soft palate. Married at 20. In the course of the pregnancy, œdemata, headache, uræmic symptoms, retinitis albuminurica, increase in the quantity of urine, specific gravity 1009, little albumen, few casts. After the birth of a dead child, subsidence of the symptoms, but marked hypertrophy of the heart and increased tension of the blood-vessels. As the appearances in the circulatory apparatus show, this is a case of chronic nephritis which had existed for some time and which has developed gradually and insidiously, probably in connection with the diphtheria gone through in childhood. But the patient has never noticed anything wrong; during the married state only and in consequence of pregnancy the disease assumed a serious character and compensatory disturbances soon made their appearance.

It is not necessary for violent symptoms to show themselves at the very first pregnancy; but even where the latter has taken a favourable course a lasting deterioration in the state of the kidneys does not as a rule remain wanting. Each following pregnancy then increases the dangers and sooner or later the patient is bound to succumb to her nephritis.

A case observed by *v. Leyden* and communicated by *Weinbaum* illustrates very clearly the injurious influence of repeated pregnancies. Three normal labours which presented no disturbing features in a woman with chronic nephritis are succeeded by 5 miscarriages with a constant increase in the renal symptoms from which the patient died during her last pregnancy. *Fellner* reports a case from *Schauta's* clinic of a nephritis in the course of which hemiplegia occurred in the 8th month of the 3d pregnancy. The same occurred again in the 9th month of the 8th pregnancy and led after induction of premature labour to a fatal issue.

The prognosis of nephritis in married women need not necessarily always be such a sad one; the injurious influence of pregnancy upon the disease is sometimes absent. Occasionally we even see during pregnancy, as *Löhlein* points out, an improvement or a complete disappearance of the nephritic symptoms. *Fellner* found among the registers of births of *Schauta's* clinic 29 histories recording nephritic phenomena previous to the respective pregnancies, but none in the course of the latter. It must however be admitted that they refer to simple pregnancy-nephritis or to genuine chronic inflammation of the kidneys.

I myself saw a lady who developed a severe acute nephritis in 1892 in consequence of sepsis and who married in 1895 contrary to medical advice. The urine still contained then moderate quantities of albumen, leucocytes and scanty hyaline casts. The pregnancy took a perfectly favourable course and ended with the birth of a living child, and so far there has been no aggravation whatever of the conditions; the state of the urine is still entirely unchanged, and of other subjective or objective symptoms there is no trace. There has not however been another pregnancy since.

Most instructive, as regards the life-saving influence of the interruption of the pregnancy on the one hand, and as regards the importance of the prevention of pregnancies on the other, measures by which a compara-

tively favourable course of the renal affection has been achieved, is the following case of *Senator*:

Woman, pregnant 12 years ago. Nephritis. Premature labour. After two years fresh pregnancy. In the course of the latter hemiplegia of the right side. The pregnancy is interrupted. Since that time conception has been prevented. The hemiplegia is at the moment almost entirely gone; the nephritis has made no progress; the urine contains only slight traces of albumen.

It must certainly be admitted that the consideration of the subject on the strength of hospital material exclusively, supplies a rather gloomy picture, since that material generally consists of the severest cases only and is recruited from a class of people who are not in a position before and during pregnancy to take care of themselves, and in whom nephritis takes from the very beginning a virulent course. *Hofmeier* who in a previous calculation saw of 137 renally-diseased pregnant women 33% die before and during parturition from the effects of nephritis (without eclampsia), admits now that this figure is rather too high. Among the better classes the prognosis is somewhat more favourable. And yet it is not good enough to enable us to say that *Fellner* is wrong when he asserts that: "a pregnancy complicating chronic nephritis leaves behind it far more serious detriments than for instance in the case of heart-disease.—The prognosis of pregnancy complicated by chronic nephritis is a very sad one for mother and child, a fact which has not hitherto been sufficiently appreciated by medical practitioners or the lay public."

As regards the dangers which threaten the life of the mother apart from the increase in the nephritic process, we can summarize them briefly: They are principally premature detachment of the placenta with atonic hæmorrhages, and eclampsia. The latter certainly occurs in a smaller number of cases than in pregnancy-nephritis, although the main causation recognised by the majority of authors, namely insufficient activity of the kidneys and deficient elimination of toxic products is the same in both processes. This is not the place to enter into a detailed description of the theories of eclampsia, but the reason is prob-

ably that in chronic nephritis, as we shall soon see, miscarriage occurs very frequently and at a very early stage, and that with the expulsion of the fœtus a source of toxæmia, so to speak, to the maternal organism disappears.

Prohibition of marriage for women with chronic nephritis.—What are the conclusions to be drawn, from the facts narrated above, by the medical practitioner who is asked whether females with chronic nephritis should be allowed to marry? There can be no doubt from what has been said that a radical prohibition of marriage is perfectly justified. Where the persons seeking advice on the point think that they have reason to disregard it, the physician's duty is to inform their relatives as to the dangers of the marriage and to point out the importance of averting it, if possible.

In the first place the avoidance of pregnancy by the employment of anti-conceptional remedies—it is not necessary to say here anything as to their nature—is to be recommended. Where the injurious influence of pregnancy is eliminated, we may take it for granted that chronic nephritis takes no other course in married women than in those unmarried.

Interruption of the pregnancy in chronic nephritis.—Where pregnancy has occurred, the physician will have to consider whether and for how long he must try to obtain an improvement in the symptoms by the usual dietetic and other therapeutic remedies directed against nephritis, and whether it is possible to await the natural end of the pregnancy. On this point almost all obstetricians are agreed—contrary to what has been said above in respect of pregnancy-nephritis—that active interference is indicated, especially if a material aggravation has taken place from the commencement of the pregnancy and the symptoms have rapidly reached a dangerous degree. Nature herself shows us the way, since there frequently ensues after the death of the fœtus and its spontaneous expulsion, an improvement in the nephritis—according to *Fellner* a sort of *vis medicatrix naturæ*, and at the same time a proof how injuriously the products of the fœtal metabolism react on the kidneys.

With regard to the time of interference it is not possible

to lay down any definite rules; nor does the alleviation expected from the artificial labour-act always set in. But in any case it is to be presumed that the longer the chronically diseased kidney of the pregnant woman is subjected to the sum of injurious influences the more severe and the less reparable the alterations will become. The decision to induce artificial abortion will therefore be taken as early as possible, if the albuminuria becomes more pronounced, if the organised elements, namely the hitherto scanty casts become more abundant, if frequent headaches, gastric and intestinal troubles point to an increasing insufficiency of the renal activity, if hæmorrhages occur, but above all if there are signs of disordered cardiac action, of commencing retinitis albuminurica or of eclamptic attacks. Disturbances in the cardiac compensation render the artificial determination of the pregnancy at as early a period as possible more imperative than any other condition, since it is but natural that the older the fœtus is and the more fully developed, the greater the demands made upon the action of the heart during the labour-act. Severe collapse with a fatal issue has repeatedly been observed in chronic nephritis during and immediately after labour.

The decision of an early artificial interruption of the pregnancy in the case of nephritis of the mother will not cause any great difficulties to the medical attendant, the more so, as the chances of a viable child being born are comparatively very slight.

With every fresh pregnancy, as we pointed out more circumstantially above, the danger to the mother becomes greater and greater, and she is brought "nearer and nearer to her grave." For this reason it is the duty of the physician even where a first pregnancy has been successfully tided over, contrary to his expectation, to warn most energetically against further conception.

Should nephritic mothers suckle their children? Whereas, according to *Senator*, a pregnancy-nephritis which has been overcome offers no contra-indication, lactation is in the presence of chronic nephritis not to be recommended, because it appears to act unfavourably upon the state of health of the

mother. (See *Senator* "Die Erkrankungen der Nieren, 2nd edit. p. 248.)

The influence of the nephritis of the parents upon the offspring.—Let us consider now the influence which inflammatory diseases of the kidney in one or other of the parents exert upon the life and health of the offspring: Here also the illness of the mother is by far of greater importance.

In pregnancy-nephritis the consequences are practically of no moment. Where out of regard for the welfare of the mother a premature interruption of the pregnancy is not rendered necessary, there is not associated with the disease any injury to the viability of the embryo.

It is however different in the case of chronic nephritis. Here, there are, quite apart from the requisite medical interference, two factors which are disastrous for the fœtus: In the first place chronic nephritis in a pregnant woman causes not infrequently intra-uterine death of the fœtus, an observation for which we are indebted to *Fehling*. The causes lie chiefly in a deterioration of the nutrition-material which reaches the fœtus, as the maternal blood is loaded with toxic matter owing to the insufficient action of the kidneys. Then there are placental changes which lead to an obstruction in the placental circulation and consequently to a deficient nutrition, a sort of "slow inanition" of the fœtus. These changes consist according to *Fehling* in the appearance of so-called white infarcts, in disease of the fœtal blood-vascular connective-tissue apparatus, in destruction of numerous placental villi, degeneration of the chorion, and similar other such occurrences. Secondly, the pregnancy is frequently interrupted spontaneously through premature labour. According to figures quoted by *Hofmeier* there occurred premature labour 13 times and abortion 17 times out of 45 cases of chronic nephritis. *Braun* saw as many as 89% of his cases end in premature labour; *Fellner's* statistics relating to cases from *Schauta's* clinic show 50% of premature labour; the entire mortality of the children amounted in cases without eclampsia to 34%; others give much higher figures.

But whereas the dangers of chronic nephritis in the procreator are great to the offspring, while the latter are as yet in the foetal state, they are only insignificant at later periods. Among the hereditary diseases, at least when using the term in its popular sense, chronic nephritis is not included, or better said, there are only a few isolated cases in which a sort of extraordinary "hereditary albuminuria" has been reported as having attacked members of the same family at various ages as far as the third generation. In the French literature mention has recently been made several times (*Fournier, Fieux* and others) of an "hereditary albuminuria" and nephritis in newly-born children and sucklings whose mothers had been eclamptic. We cannot however speak here of an heredity, seeing that these are cases of direct toxic action on the part of the blood of the eclamptic mother upon the foetal kidneys. As to the later history of such children and especially whether these albuminurias pass afterwards into chronic nephritis there is no sufficient material as yet collected. All these observations are so far more of interest as literary curiosities than as factors possessing any practical importance.

Summarising at the termination of our remarks on the relations between nephritis and marriage the principal conclusions which are important in guiding the medical practitioner to arrive at a decision, they may be said to be as follows: The duration of life of candidates for marriage suffering from nephritis is, to begin with, shorter than under normal circumstances. This applies to an unequally greater extent to the female sex than to the male in so far as, with regard to the former, marriage and particularly pregnancy with its consequences supply factors which are capable of causing considerable injuries to the kidneys, which almost invariably aggravate an affection already existing and which not infrequently are directly dangerous to life.

For this reason the decision of the medical practitioner is of far greater moment to the wife than to the husband. Women with chronic nephritis ought always to be prohibited from marrying. But where they do marry the avoidance of pregnancy must at least be insisted upon; if pregnancy has

occurred the earliest possible interruption of the same is indicated, in case the symptoms undergo an aggravation, not only on account of the life of the mother but also in view of the improbability that the embryo will be born alive. Much less dangerous is the nephritis of pregnancy, and the determination of the gestation in the course of it is far more rarely necessary owing to complications, such as eclampsia, retinitis, etc. Moreover, contrary to what takes place in chronic nephritis, pregnancy-nephritis does not become more dangerous to the mother with repeated pregnancies, but rather less so. A transition to chronic nephritis does happen but is not of frequent occurrence.

Amyloid Disease of the Kidney.

The amyloid disease of the kidneys is a secondary process which may be due to curable and incurable causes. Where the latter is the case, marriage must of course be prohibited. On the other hand it is possible that with the disappearance of the cause of the lardaceous degeneration the process in the kidneys may come to a standstill, and provided the disease has not gone too far for the intact portions of the organs to maintain the function as in the normal state. Thus for instance anti-syphilitic treatment may prove successful against the renal affection as well. The consent to, or prohibition of, marriage does not however depend in such cases upon the condition of the kidneys but entirely upon the syphilis in general; for further details the reader is referred to the respective chapter.

Movable Kidney.

Movable or wandering kidney is of practical importance in the female only. In men the condition has been observed in an insignificant number of cases, and besides, the diagnosis is not always certain. We will therefore consider the influence of the married state in women only.

In the first instance we must examine in this connection whether pregnancy and parturition supply any elements favouring or aggravating the complaint. Opinion on the subject varies. Numerous authors see in the relaxation of the abdom-

inal walls, especially after repeated pregnancies, and in the muscular over-exertion during labour, as well as in the insufficient care after that event, an important factor in the displacement of the kidney. According to *Senator, Rollet*, and others, the predisposition of multiparæ to movable kidney is greater than in other women. On the other hand *Brault, Matthieu, Knapp* and others have noticed also in multiparæ without any flaccidity of the abdominal wall a considerable percentage of movable kidney. At any rate the influence of pregnancy in this respect is unmistakable. It cannot be denied that the symptoms of an existing movable kidney often exacerbate during pregnancy and more so after the confinement, and this becomes apparent principally by the increase in the pain. That it is possible owing to the pressure of the pregnant uterus for hydronephrosis or intermittent hydronephrosis to develop occasionally in a dislocated kidney has been proved by a few reported cases.

On the other hand observations have been recorded where the complaints caused by movable kidney have not only subsided during pregnancy but where the dislocation appeared rectified after parturition. In such cases marriage exerts therefore a decidedly healing influence.

In any case floating kidney is in by far the preponderating number of cases so harmless a complaint, and severe complications in the married state are so rare that it does not present any reasonable ground for prohibiting a marriage.

Pyelitis, Pyelonephritis and Pyonephrosis.

We will consider these diseases together since they only represent different degrees of one and the same process.

The relations which they bear to the married state are also far more prominent in the female sex. In man marriage does not present any special factors which influence the course of these diseases. In so far as the pyelitis is of gonorrhœal origin the consent to the contraction of a marriage will depend upon the remaining manifestations of the gonorrhœal infection and it will therefore be treated in the chapter dealing with the latter disease.

In any case the physician whose advice is sought on the point will have to remember that chronic pyelitis and pyelonephritis is a long-lasting disease which generally resists all internal medication and is no less difficult to treat locally, that perfect cures are not often achieved, but that on the contrary very severe complications may sometimes arise through congestion of urine and retention of pus. The duty of the medical adviser is therefore to point out to candidates for marriage that pyelitis is not exactly so harmless a complaint as it is yet generally thought to be.

In the wife, marriage is capable of giving rise to pyelitic processes, or it may considerably aggravate those already existing to such an extent as to even endanger life. We do not speak here of the transmission of gonorrhœa by means of the sexual intercourse, an infection which is just as often the cause of purulent inflammations of the pelvis of the kidney in women as it is in men. It is rather pregnancy which we are thinking of and which offers a most favourable soil for the formation and progress of pyelitis.

The causes lie first of all in the congestion which takes place during pregnancy in the pelvic and abdominal organs. The bladder is affected in the first instance and as long as the process may advance from there upwards as far as the pelvis of the kidney, the latter is therefore indirectly also subject to be attacked. But the kidneys themselves also become congested with blood and offer therefore to the microbes coming from the neighbourhood into the pelvis of the kidney by means of the circulation a suitable medium of propagation. Secondly, mechanical conditions also come into play; overcrowding in the pelvis on account of the pregnant uterus, and still more, a stranguation of the ureter leading to an obstruction in the passage of the urine, thus causing in its turn further venous congestion and thereby facilitating the settlement of infective existing agents in the pelvis of the kidney.

What influence does pyelitis exercise upon the course of pregnancy? The latter may in spite of grave symptoms reach its natural end.

Fellner reports two such cases: they both refer to the

same pregnant woman, during her first and second pregnancies. In the first pregnancy the symptoms were at the beginning rather slight; but at the 6th month a considerable aggravation took place. There was a discharge of pus from the right ureter, as proved by cystoscopic examination. Neither general nor local treatment appeared to have any effect, so premature labour was decided upon. The patient however would not agree to this, and gave birth afterwards to a living mature child. The same process repeated itself in the second pregnancy.

A similar favourable result was also recorded in the cases of *Vinay*. For this reason, this author is opposed to the artificial interruption of the pregnancy even in severe cases. Others, like *Depage*, *Fellner*, etc., try at first to remove the complaint by suitable treatment, but are in favour of premature labour being instituted where there is protracted elevation of temperature and an unsatisfactory general condition, the more so as with the occurrence of the abortion and the disappearance of the pressure and the congestion, the pyelitis also disappears as a rule.

Sometimes pregnancy may give rise to an aggravation of simple pyelitis to the extent of severe pyonephrosis. Such a case is communicated by *Israel*:

The patient in question miscarried in her first pregnancy. In association with this, cystitis; 3 years afterwards, renewed pregnancy. In the course of the latter there were as yet no renal complaints, but during the puerperium, pain in the left side and fever. The disturbances subside until the next pregnancy and puerperium, which, particularly the latter, cause such an acute exacerbation of the symptoms that nephrotomy becomes necessary. In the third pregnancy, violent pains in the abdomen. Growth of a pyonephrotic sac, to the size of a child's head. Later, nephrectomy.

Pyelitis is therefore in women also by no means a harmless affection, and women with pyelitic symptoms should in any case undergo a thorough treatment before being allowed to marry.

According to some authors (*Depage*, and others) the pyelitis of pregnant women is altogether not a process which commences during pregnancy, but a recrudescence of old inflammatory remains, such as is caused especially by the upward extension of cystitis which is so frequent in women.

Tuberculosis of the Kidneys.

In the consideration of the influence of the married state upon the tuberculosis of the kidneys and of the question of the consent to marriage in such cases, we can here take notice of those forms of the disease only, in which the tuberculosis has attacked the kidneys exclusively, or at least where the renal symptoms occupy the foremost place in the clinical picture. Where the disease of the kidneys forms a part-symptom of a general tuberculosis, and especially where it is present in combination with pulmonary tuberculosis, the latter is the factor which will influence the decision of the medical adviser. And also where it is a case of the so-called ascending form, that is, the form which takes its origin from a tuberculosis of the bladder or of the generative organs, the primary cause must necessarily be the decisive element, if only on account of the risk of infection by means of sexual intercourse.

We will therefore discuss in this article only cases of descending or so-called primary tuberculosis of the kidneys which is bound to affect in its later course also other parts of the urinary apparatus. The practical interest of this form lies principally in the fact that it is not at all, as was previously believed, of rare occurrence; but that it is, on the contrary, as *Israel* especially has pointed out, a comparatively frequent disease of the kidneys.

As regards the consequences of marriage to the husband suffering from renal tuberculosis, they are practically covered by those of sexual intercourse altogether, which is sure to favour a rapid extension of the tuberculous process. The abstention from sexual connection in tuberculosis of the kidney appears therefore to be indicated.

In the wife there are to be added to the injurious effects of

sexual intercourse those of its results, namely pregnancy and parturition, and to an even greater extent than it has been repeatedly explained with respect to other diseases of the kidney. *Israel* observes truly: "If the unfavourable influence of pregnancy affects all renal complaints, it does so, above all, tuberculosis." We not infrequently see that for years the malady produces no symptoms at all, or, at the utmost, only such as would result from a slight cystitis with inconsiderable urinary disturbances, a somewhat increased desire for micturition, or similar inconveniences, so that nothing lies further than the thought of a renal affection, and especially tuberculosis. It is only during pregnancy that a rapid aggravation of the symptoms takes place, which guides to a correct diagnosis. This is clearly demonstrated by a case described by *Israel*. (Chirurg. Klinik der Nierenkr., p. 220.)

Mrs. G., 20 years old, has with the exception of a somewhat frequent micturition and a paroxysmally occurring pain in the region of the left kidney, which however disappeared very quickly, never suffered from any illness of the urinary organs. She married without knowing that she was subject to any disease. In the first months of pregnancy rapid decline, under formation of an enormous renal tumour. In the purulent renal secretion tubercle bacilli were demonstrated. The left kidney is removed, and is seen to have changed into a system of large pus-containing sacs separated by thin partition-walls. The pregnancy goes on after the nephrectomy without any disturbance. The patient is confined of a healthy child, and has since undergone several pregnancies without any injury.

It is possible even for several pregnancies to pass without any symptoms until the last one occasions a considerable aggravation of the disease which had hitherto hardly been noticeable, or at any rate unknown to the patient and her friends. A remarkable instance of this sort is also contained in *Israel's* casuistic communications:

In a patient who has already gone through two normal confinements and in whose history there is noth-

ing of consequence to be mentioned except a pleurisy from which she suffered at an early age, and occasional bronchial catarrhs, who had further never complained of any troubles in connection with the urinary organs, except an increased desire for micturition, there came on in the first month of pregnancy violent renal colic. The right kidney swelled up rapidly and considerably, the right ureter was distinctly to be felt thickened. After the induction of abortion the condition improved, the attacks of colic appeared at long intervals, the swelling disappeared. The tuberculous nature of the disease being afterwards established with certainty, the kidney was extirpated.

Finally it is possible under the influence of pregnancy for an operated and healed-up tuberculosis of the kidney to break out afresh. *Israel* communicates the following pertinent case:

In a woman with renal tuberculosis the amputation of the upper third of the left kidney is performed. After the operation the urine becomes perfectly clear, the patient goes through a pregnancy and labour without injury to her general health. In the second pregnancy miscarriage occurs in the second month, and is succeeded by marked lassitude, fever and frequent micturition. The urine contains pus and some albumen. Tubercle bacilli are not found. Nephrectomy reveals a tuberculous kidney.

Much more deleterious are the consequences of pregnancy if the tuberculosis not only attacks one kidney, but if after the operation of nephrectomy the remaining organ is also found not to be perfectly intact. A case communicated by *König* illustrates this condition better than any amount of theoretical explanation:

The left kidney of a 17-year-old girl is removed on account of tuberculosis. Despite the proof that the right kidney is also affected the patient gains in weight, feels perfectly well and enjoys life so much that she is constantly and for years worrying the operating surgeon to allow her to get married. He refuses to do so.

The patient marries contrary to advice, becomes pregnant, develops hæmaturia and dies in the puerperium.

To avert these dangerous consequences if pregnancy has supervened, two remedies come into consideration: artificial premature abortion and nephrectomy. If practicable, and above all, if the condition of the second kidney offers no contra-indication, the latter course is to be preferred. The abortion, it is true, removes the danger for the moment, but it is naturally not to be expected that it will act as a permanent cure of the tuberculous process, whereas such a result is possible after nephrectomy. That notwithstanding nephrectomy a pregnancy can continue to its natural conclusion and that also subsequent pregnancies and labours may run a favourable course is proved by the above-quoted cases.

What are we to conclude now from these facts with respect to the consent to marriage? It is only those cases that can come here into question, where a successful treatment, either medicinal or surgical, has been instituted, cases which consequently do no longer exhibit any symptoms; for, that cases with manifest renal tuberculosis necessitate an absolute prohibition of marriage, follows as a matter of course, apart from other reasons, from the aggravation which sexual intercourse occasions to begin with. The difficulty for the physician lies chiefly in the circumstance that but in rare cases the diagnosis of commencing tuberculosis of the kidneys can be readily made. There is hardly another disease of the urinary organs which in its early stages is so often mistaken as this one. If with the exception of a slight increase in the frequency of micturition there is nothing to point to an affection of the uropætic system, if the urine is perfectly normal or if it shows at the outside insignificant cystitic changes, such as are frequently observed in the female sex without any special reason, if the patients present at the same time for years the picture of perfect health, it is not surprising that tuberculosis is little thought of, and especially tuberculosis of the kidneys. Nevertheless it must again be emphasised that the disease is by no means rare and that it deserves the attention of the general practitioner.

In the cases which have undergone treatment, particularly

in those where by the extirpation of the kidney the tuberculous focus has been eliminated, where there has consequently been as yet no spreading of the disease along the ureters into the bladder, as may be proved among other means by cystoscopic examination, and where the persons concerned have for some time since the operation enjoyed perfect health, an absolute prohibition of marriage is probably not quite justified. Here at least there need not be any injurious influence exercised on the part of the marriage; for we have seen in some of the cases mentioned above that after nephrectomy repeated pregnancies have been well endured and that they resulted in the birth of viable children. The definite decision of the medical adviser will not depend so much either on the previous history of the disease, that is, the tuberculosis, but it is rather the circumstance generally whether and when marriage is permissible after the sacrifice of so vital an organ as the kidney, that will constitute a weighty argument in the consideration. This question will yet engage our attention in another place.

Renal Calculi and Renal Tumours.

We can deal with these affections in a very few words. Marriage exercises hardly any influence upon the course of nephrolithiasis unless it is upon the pyelitis caused by it. (See under *pyelitis*.) But the physician consulted with regard to the contraction of marriage will have to bear in mind that renal calculus is an affection whose duration and course cannot be determined beforehand, that free intervals extending over long periods happen in its course, but that the life of the patient may be endangered by acute complications and that, even without these, the consequences to the renal activity and to the entire organism may become very serious. At any rate the life-duration of individuals with renal calculi must be regarded as shorter than that of normal persons.

It appears moreover that the offspring of such individuals are also in peril inasmuch as heredity plays here undoubtedly a part, though, with respect to calculi, not to such an extent as was formerly believed. It certainly more rarely happens that nephrolithiasis as such is inherited than that allied con-

stitutional anomalies especially gout and diabetes are met with in the respective families.

Be that as it may, the physician will have to point out to the descendants of families so predisposed the risk which they are running, and to endeavour to prevent the disease, especially if such districts come into play in which lithiasis is endemic, and if there are also other unknown factors concerned in the matter, such as climate, the constitution of the soil, drinking-water (?), etc. Since we are at present powerless in the face of these factors about which we know so little, it will often be necessary to recommend a removal into some other locality.

It is scarcely necessary to mention that no cautious medical man will ever think of consenting to the marriage of persons with renal tumours.

Renal Operations especially Nephrectomy.

The great success which renal surgery has achieved in recent times makes it of practical interest to consider the question whether and how far it is justifiable to prohibit the marriage of individuals who possess only one kidney. This point has as far as we know been raised for the first time by *Schramm* in connection with a case which he reported in the *Berliner Klinische Wochenschrift* in 1896.

It concerned a patient who, having undergone nephrectomy in 1891 on account of hydronephrosis, married 3 years later and became pregnant soon afterwards. During the pregnancy the excretion of urine increased to a marked degree; the urine was of low specific gravity and contained albumen, so that it was at first thought to be a case of chronic nephritis. Later on *Schramm* considered that a congestive albuminuria was a more probable cause; the labour passed off normally and the albuminuria disappeared rapidly soon afterwards.

On the strength of this observation *Schramm* goes into the subject which interests us here, namely on the attitude of the physician in the presence of a woman with one kidney who wishes to marry, and whether, if she is already married, she

has to apprehend any serious dangers from eventual pregnancies. In spite of the favourable issue in his case he takes up a rather reserved position; he arrives at the result that such "patients" should be prohibited from contracting marriage or at least from cohabitation, because they expose themselves during pregnancy to the risk of a pregnancy-nephritis or chronic nephritis, against which, having only one kidney, they will naturally be able to offer but a diminished resistance.

To-day when the casuistic literature is more extensive than it was at that time, it is open to argument whether this absolutely pessimistic view is justified at all. The points of view which should guide the physician in his attitude that need not necessarily be a negative one are in our opinion as follows:

1. It is necessary that the nephrectomy be dictated by a cause which has at least in all probability been removed with the removal of the kidney. But if the operation was indicated by the presence of a malignant tumour (carcinoma, sarcoma, struma renalis, etc.) the risk of relapse justifies a prohibition of the marriage. So far, at any rate, the distant results of operation in such cases even if it is performed at the earliest stage, are not good enough, to warrant the assumption of a longer duration of life.

2. Where the original illness is in itself no obstacle against marriage, the remaining kidney must with certainty be known to be anatomically and functionally sound; otherwise there is, particularly in pregnancy, great danger. I have already mentioned the case of *König* where a person with a diseased second kidney lived apparently in good health until she married; during her pregnancy disturbances on the part of the renal activity made their appearances, and the woman died in the puerperium. The case illustrates the oft-repeated experience that a diseased kidney is capable for some time of fulfilling the demands made upon its function by the organism, but that it becomes unequal to it as soon as these demands increase for any reason to too great an extent. The fears entertained by *Schramm* that the remaining sound organ will also be affected by the more difficult circulatory conditions established during pregnancy, by the increased secretory activity, especially in so far as the toxic

substances formed by the maternal and foetal organisms are concerned and by similar other agencies, are certainly justified and noteworthy, at least theoretically. Nevertheless experience, which is after all our best teacher in spite of all theoretical assumptions, shows us that these apprehensions need not by any means always be realised in practice. Thus *Tredondani* reports, though more as a curiosity, the case of a woman in whom nephrectomy was performed, and who gave birth afterwards to 3 healthy children; and he reproves those earlier authors who desired to ascribe to the operation an injurious influence upon pregnancy. And from *Israel's* rich experience we have in previous passages also quoted several cases in which pregnancy ran a normal course in spite of previous nephrectomy.

In man the conditions are naturally far more favourable than in woman. Really speaking, there are no factors in his case which can occasion an injurious influence upon the married state, provided the above precautions are duly taken.

How very little agreement there is between a too rigorous interpretation of the condition of affairs and the actual facts, was shown to me by a case of my own observation, in which a man who had had one of his kidneys removed on account of pyonephrosis was strongly advised by a high medical authority not to get married; an engagement into which he had already entered was consequently broken off. The gentleman in question did not however adhere to the medical advice for good; he married subsequently and is now after 8 years of married life the father of 3 healthy children; he is in splendid health.

I N D E X

(Words in brackets following a name denote the subject dealt with by that Author.)

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